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FAA Technical Center
Atlantic City International Airport
N.J. 08405

Study of the Engine Bird Ingestion Experience of the Boeing 737 Aircraft

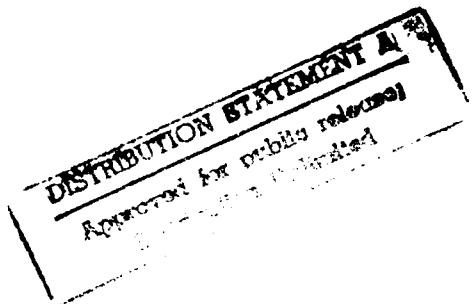
(October 1986 - September 1989)

October 1991

Final Report

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16. Abstract The Federal Aviation Administration (FAA) Technical Center initiated a study in October 1986 to determine the numbers, weight, and species of birds which are being ingested into medium and large inlet area turbofan engines and to determine what damage, if any, results. Bird ingestion data were collected for the Boeing-737 model aircraft which uses either the Pratt and Whitney JT8D medium inlet area turbofan engine or the CFM International CFM56 large inlet area turbofan engine. This final report analyzes the entire 3 years of data collection which extended from October 1986 through September 1989.		
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FOREWORD

This final report provides descriptive and statistical analyses of the data collected over a 3-year period on bird ingestion experiences for the B737 aircraft. The data described in this report were collected under separate contracts with the engine manufacturers.

The report was prepared by the University of Dayton under Department of Transportation, Federal Aviation Administration Contract DTFA03-88-C-00024. The technical project monitor for the FAA during the preparation of the report was Mr. Joseph Wilson. Portions of the engine damage/failure analysis (Section 6) were performed by Mr. Wilson. The principal investigator at the University of Dayton was Dr. Peter W. Hovey and computer support was provided by Mr. Donald A. Skinn.



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EXECUTIVE SUMMARY

An investigation was initiated by the Federal Aviation Administration Technical Center in September 1986 to determine the numbers, weight, and species of birds which are ingested into medium and large inlet area turbofan engines during worldwide service operation and to determine what damage, if any, results. This report summarizes the 3-years of Boeing-737 (B737) data that were collected to support this effort. The first year of data is published under report number DOT/FAA/CT-89/16 [1]. The first and second years of data are summarized together and published under report number DOT/FAA/CT-89/29 [2].

Figure E-1 is an overall summary of the data that were collected during the 3 years of this investigation which extended from October 1986 through September 1989. A total of 8.91 million aircraft operations were flown by B737 commercial aircraft during the 3-year period. B737 aircraft equipped with Pratt and Whitney JT8D medium inlet area turbofan engines accounted for 71.8 percent of these flights. The remaining 28.2 percent of the flights were made by B737 aircraft having CFM International CFM56 large inlet area turbofan engines.

During the 3 years of data collection, birds were ingested by one or both engines during 1,076 aircraft operations which yields a probability of aircraft ingestion of 1.21×10^{-4} . One or more birds were ingested into both engines of the aircraft during 31 of the 1,076 aircraft ingestion events. Thus, a total of 1,107 engine ingestion events were reported during the data collection period. There were 17.82 million engine operations during this period which yields a probability of engine ingestion of 6.21×10^{-5} . A conclusion of these data is that bird ingestion events are rare, but probable events.

When the species of the ingested bird was reliably identified, the most commonly ingested birds were from the order charadriiformes (shorebirds)-- primarily gulls, lapwings, and plovers. The majority of ingested birds (155 of 167) weighed 40 ounces or less. The bird weight distribution of ingested birds in the United States was different from the distribution in foreign countries. The mean and median weights of ingested birds in the United States were smaller than abroad; however, the mode weight of ingested birds was smaller abroad than in the United States. The mean weight of foreign ingested birds was 31.8 percent larger than the mean weight of United States ingested birds due to the high ingestion rate of large birds abroad. Four birds larger than 4 pounds were ingested abroad; whereas, only 1 bird larger than 4 pounds was ingested in the United States. The bird ingestion rate within the United States was significantly lower than the foreign bird ingestion rate.

The majority of aircraft ingestion events (972 of 1,076) involved a single bird and a single engine on the aircraft. The remaining 104 aircraft ingestion events involved multiple birds and/or multiple engines.

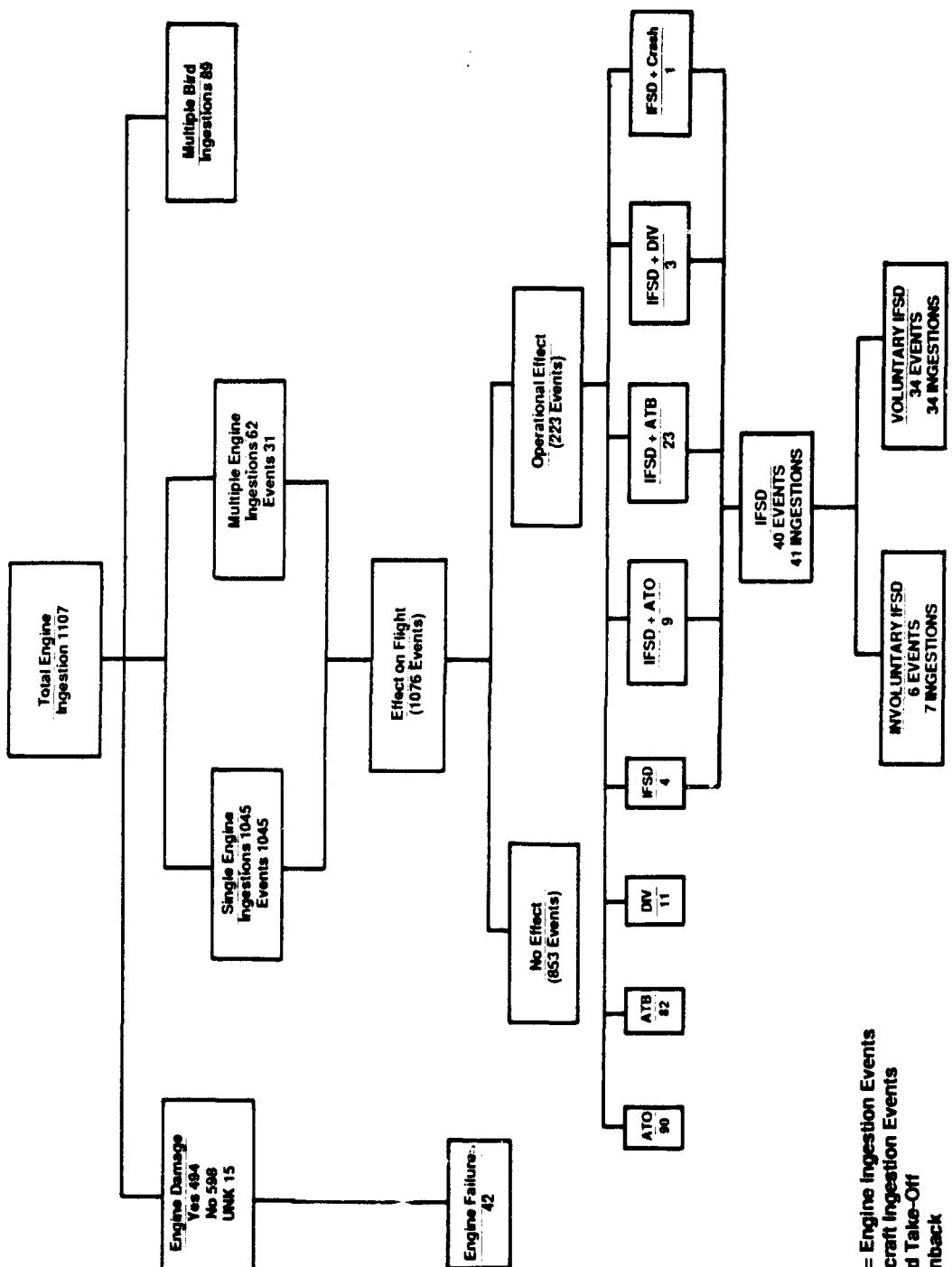


Figure E-1. 737 Aircraft Engine Bird Ingestion Study Data Summary
(3 Years of Data, 10/86 to 9/89)

Engine damage occurred in 45 percent of all engine ingestion events and there were 175 engine ingestions that resulted in engine damage classified as moderately severe or worse.

The majority (578 of 718) of aircraft ingestion events, for which the phase of flight was known, occurred within the airport environment during takeoff and landing. The probability of engine damage is greater when the bird ingestion occurs during the takeoff and climb phases of flight than when it occurs during approach and landing. Aircraft airspeed at or above 140 knots also increases the probability of engine damage.

It was determined that 3.8 percent of all engine bird ingestion events resulted in an engine failure. Five engine failures were caused by birds that weighed less than or equal to 1 pound. Engine failures are also more likely to occur when multiple birds are ingested into an engine.

The following summary shows the most pertinent statistics extracted from the 3 years of data for the B737 aircraft:

Median Bird Weight* (oz)	Worldwide	10.0
Mode Bird Weight** (oz)	Worldwide	14.0

Probability of Ingestion Per Aircraft Operation

Worldwide	1.21×10^{-4}
United States	0.59×10^{-4}
Foreign	1.94×10^{-4}

Most Commonly Ingested Bird

United States	Dove/Gull
Foreign	Gull/Lapwing/Vulture

*Divides weight into two groups with half the weights below the median and half above.

**The weight that has the highest frequency.

Engines Experiencing Moderate/Severe Damage	175
Multiple Bird, Engine Ingestion Events	89
Dual Engine Aircraft Ingestion Events	31
Dual Engine, Multiple Bird Aircraft Ingestion Events	11
Single Engine, Multiple Bird Aircraft Ingestion Events	73
Aircraft Ingestion Events By Phase-of-Flight	
Takeoff and Climb Phase-of-Flight	63.8%
Approach and Landing	33.4%
Airports Reporting Bird Ingestions	323
Ratio of Reported Events to Aircraft Operations	
United States	0.59×10^{-4}
Foreign	1.94×10^{-4}

SECTION 1

INTRODUCTION

1.1 BACKGROUND.

Contention for airspace between birds and airplanes has created a serious bird/aircraft strike hazard. Past studies [1,2,3] have indicated that birdstrikes to engines are statistically rare events. The probability of a birdstrike during any given flight is extremely low; however, when the number of flights is considered, the number of birdstrikes becomes significant.

The windshield and the engines are particularly vulnerable to the birdstrike threat. Although penetration of the windshield by a bird is primarily a concern for military airplanes operating at high speeds in a low-altitude environment, such a penetration has occurred on a civilian airplane resulting in the death of the co-pilot. Ingestion of birds into turbine engines is a safety problem for commercial as well as military airplanes for it can cause significant damage to the engine resulting in degraded engine performance and very possibly failure.

In their studies of bird ingestions on commercial flights, both Hovey [1,2] and Frings [3] indicated that nearly all bird ingestion events have occurred in the vicinity of airports during the non-cruise phases of flight. This is understandable because these phases of flight naturally occur closer to the ground where bird concentrations are higher, resulting in a higher probability of birdstrike.

The solutions to the problem of engine damage resulting from bird ingestion are similar to those for windshield birdstrike, e.g., structural design consideration to withstand impact or bird avoidance. Bird avoidance can be facilitated by either of two approaches: (1) keeping airplanes out of airspaces with large bird concentrations, and (2) removing birds from these regions of airspace. The bird avoidance approach can have various degrees of success or failure for commercial air fleets because flight schedules place airplanes in specific areas at specific times and the effectiveness of airport bird control programs (if any) varies from airport to airport and country to country.

Structural design of engines to withstand bird ingestions can be accomplished provided that requirements with respect to bird weights and numbers can be identified. Bird ingestion data for medium/large inlet area turbofan engines and small inlet area turbine engines [4,5] are currently being collected by several engine manufacturers. Statistical evaluation of bird ingestion data from these data collection efforts and previous bird ingestion studies will be useful in re-evaluating certification test criteria specified in Federal Aviation Administration (FAA) regulation 14 CFR 33.77. As a result, future turbine engines can be designed to withstand more realistic bird threats.

1.2 OBJECTIVE.

The objective of this report is to determine the relationship of bird weight, number of birds ingested, geographic location, season, time of day, phase of flight, and engine type to the frequency of bird ingestion events and the extent of engine damage, if any, resulting from the ingested birds. The statistical analysis of reported bird ingestions experienced by commercial B737 airplanes worldwide over a 3-year reporting period is used to summarize the service threat and level of engine damage experienced by these airplanes. The findings of the analysis will be helpful in defining minimum engine design requirements for resistance to damage as a result of bird ingestions. Moreover, this study will provide a comparison between the experiences of a contemporary high bypass ratio turbofan engine (CFM56) and an older low bypass ratio turbofan engine with a smaller inlet (JT8D) exposed to similar aircraft-bird ingestion environments.

1.3 ORGANIZATION OF REPORT.

Section 2 defines, discusses, and differentiates airport operations and aircraft operations. Section 3 identifies the characteristics of bird species that have been ingested and reliably identified. Section 4 describes bird ingestion rates by location, engine type, and phase of flight. Section 5 provides a geographic placement of bird ingestion events throughout the world. Section 6 summarizes engine damage resulting from bird ingestions. Section 7 examines the probabilities of various bird ingestion events. Section 8 discusses the quality of the data collected in this study by examining the sources of the data and evaluating the consistency of the data from the first year to the third year. Section 9 provides a summary of the results obtained from this data analysis. Section 10 provides literature references. Section 11 is a glossary of terms.

SECTION 2

AIRCRAFT OPERATIONS AND AIRPORT OPERATIONS

Aircraft operations and airport operations data are used to determine bird ingestion rates. Operations data (and their sources) used to generate bird ingestion rates are discussed in this section. Definitions are provided to aid in understanding this data.

An aircraft operation as defined in the glossary is a nonstop flight from one airport (departure airport) to another airport (arrival airport) and consists of 7 phases of flight which include: (1) taxi-out, (2) takeoff, (3) climb, (4) cruise, (5) approach, (6) landing, and (7) taxi-in. An airport operation is considered either a departure from or an arrival at an airport. When all scheduled flights are considered, the number of airport operations is twice the number of aircraft operations.

The Official Airline Guide (OAG) is the data source for scheduled airport operations. Counts of airport operations involving B737 airplanes were extracted from OAG magnetic tapes and maintained by airport code. The counts were further categorized by month of year and hour of day so that seasonal and time of day analyses could be performed.

Table 2.1 presents the OAG airport operations counts by seasonal months for the 3-year period. The counts are also broken down by several geographic regions. Table 2.2 presents the same airport operations counts as Table 2.1; however, an adjustment for hemisphere has been made. It should be noted that the number of aircraft operations for each of these categories is one-half the number of airport operations. Frings [3] defines autumn in the Northern Hemisphere and spring in the Southern Hemisphere as the months September, October, and November. The collection period for each year of B737 data was October through the following September. Consistency with Frings is maintained in Table 2.1 and Table 2.2 by grouping operations counts for October and November with the operations counts of the following September.

Table 2.3 presents two cross tabulations of airport operations by month and OAG destination-arrival code. The first tabulation includes all airports at which one or more B737 operations were scheduled during the reporting period. The second tabulation is a subset of the first and includes only those airports at which a bird ingestion event was reported during the 3-year period. The destination-arrival code is taken directly from the OAG tapes and its values are presented as a footnote in Table 2.3.

A tabulation of aircraft operations by engine type and geographic region is required to obtain bird ingestion rates for these parameters. Table 2.4 presents a tabulation of B737 aircraft operations by engine type and geographic region for the reporting period. The OAG operations data identify implicitly the geographic region through the airport code and also identify explicitly whether the airplane is a B737; however, the engine type of the airplane is not reliably identified in the OAG data. The aircraft operations presented in the ALL ENGINES column of Table 2.4 are derived by dividing the airport operations in the TOTAL column of Table 2.1 by 2. The aircraft operations for the CFM56 engine were provided by the engine manufacturer as

TABLE 2.1 SCHEDULED OAG AIRPORT OPERATIONS BY SEASONAL MONTH
 (OCTOBER 1986 THROUGH SEPTEMBER 1989)

Geographic Location	SEASONAL MONTHS			Total
	Mar-May	Jun-Aug	Sep-Nov	
Contiguous US				
Oct'86 - Sep'87	728,180	762,922	685,560	681,306
Oct'87 - Sep'88	758,076	775,265	758,049	756,956
Oct'88 - Sep'89	815,708	838,195	791,297	777,947
Three Year Total	2,301,964	2,376,382	2,234,906	2,216,209
United States				
Oct'86 - Sep'87	771,231	807,492	726,309	722,461
Oct'87 - Sep'88	801,058	819,890	800,388	798,613
Oct'88 - Sep'89	862,495	889,311	836,328	822,768
Three Year Total	2,434,784	2,516,693	2,363,025	2,343,842
Foreign				
Oct'86 - Sep'87	619,425	647,640	604,935	591,679
Oct'87 - Sep'88	688,874	722,608	668,398	650,891
Oct'88 - Sep'89	747,501	778,335	730,340	712,736
Three Year Total	2,055,800	2,148,583	2,003,673	1,955,306
Northern Hemisphere				
Oct'86 - Sep'87	1,235,767	1,296,951	1,181,268	1,166,794
Oct'87 - Sep'88	1,314,164	1,357,068	1,295,982	1,277,954
Oct'88 - Sep'89	1,413,677	1,456,381	1,370,619	1,344,256
Three Year Total	3,963,608	4,110,400	3,847,869	3,789,004
Southern Hemisphere				
Oct'86 - Sep'87	154,889	158,181	149,976	147,346
Oct'87 - Sep'88	175,768	185,430	172,804	171,550
Oct'88 - Sep'89	196,319	211,265	196,049	191,248
Three Year Total	526,976	554,876	518,829	510,144
Worldwide				
Oct'86 - Sep'87	1,390,656	1,455,132	1,331,244	1,314,140
Oct'87 - Sep'88	1,489,932	1,542,498	1,468,786	1,449,504
Oct'88 - Sep'89	1,609,996	1,667,646	1,566,668	1,535,504
Three Year Total	4,490,584	4,665,276	4,366,698	4,299,148
				610,392
				705,552
				794,881
				2,110,825
				5,491,172
				5,950,720
				6,379,814
				17,821,706

TABLE 2.2 SCHEDULED OAG AIRPORT OPERATIONS BY SEASON
(OCTOBER 1986 THROUGH SEPTEMBER 1989)

Geographic Location	SEASONS OF THE YEAR			Total
	Spring	Summer	Autumn	
Contiguous US				
Oct'86 - Sep'87	728,180	762,922	685,560	681,306
Oct'87 - Sep'88	758,076	775,265	758,049	756,956
Oct'88 - Sep'89	815,708	838,195	791,297	777,947
Three Year Total	2,301,964	2,376,382	2,234,906	2,216,209
United States				
Oct'86 - Sep'87	771,231	807,492	726,309	722,461
Oct'87 - Sep'88	801,058	819,890	800,388	798,613
Oct'88 - Sep'89	862,495	889,311	836,328	822,768
Three Year Total	2,434,784	2,516,693	2,363,025	2,343,842
Foreign				
Oct'86 - Sep'87	614,512	636,805	609,848	602,514
Oct'87 - Sep'88	685,910	708,728	671,362	664,771
Oct'88 - Sep'89	747,231	758,318	730,610	732,753
Three Year Total	2,047,653	2,103,851	2,011,820	2,000,038
Northern Hemisphere				
Oct'86 - Sep'87	1,235,767	1,296,951	1,181,268	1,166,794
Oct'87 - Sep'88	1,314,164	1,357,068	1,295,982	1,277,954
Oct'88 - Sep'89	1,413,677	1,456,381	1,370,619	1,344,256
Three Year Total	3,963,608	4,110,400	3,847,869	3,789,004
Southern Hemisphere				
Oct'86 - Sep'88	149,976	147,346	154,889	158,181
Oct'87 - Sep'88	172,804	171,550	175,768	185,430
Oct'88 - Sep'89	196,049	191,248	196,319	211,265
Three Year Total	518,829	510,144	526,976	554,876
Worldwide				
Oct'86 - Sep'87	1,385,743	1,444,297	1,336,157	1,324,975
Oct'87 - Sep'88	1,486,968	1,528,618	1,471,750	1,463,384
Oct'88 - Sep'89	1,609,726	1,647,629	1,566,938	1,555,521
Three Year Total	4,482,437	4,620,544	4,374,845	4,343,880

TABLE 2.3 OAG AIRPORT OPERATIONS BY MONTH
(OCTOBER 1986 THROUGH SEPTEMBER 1989)

ALL AIRPORTS WITH SCHEDULED B737 OPERATIONS

MONTH	OAG DESTINATION-ARRIVAL CODES **					(Total)
	(0)	(1)	(2)	(3)	(4)	
OCT	641,872	776,446	11,516	212	8,986	1,439,032
NOV	630,484	750,104	11,174	146	9,064	1,400,972
DEC	653,862	766,540	12,090	108	10,228	1,462,828
JAN	661,904	791,504	12,556	174	9,682	1,475,820
FEB	607,282	733,084	11,566	174	8,394	1,360,500
MAR	669,266	805,420	12,456	180	8,934	1,496,256
APR	661,436	783,124	11,738	212	8,130	1,464,640
MAY	693,966	814,452	12,124	264	8,882	1,467,688
JUN	685,538	803,792	13,042	182	9,100	1,511,654
JUL	708,036	831,962	13,700	290	10,008	1,563,996
AUG	720,400	845,508	13,336	350	10,032	1,589,626
SEP	700,354	804,790	12,440	364	8,746	1,483,634
TOTAL	8,034,400	9,526,726	147,738	2,656	110,186	17,821,706

AIRPORTS EXPERIENCING BIRD INGESTIONS DURING REPORTING PERIOD

MONTH	OAG DESTINATION-ARRIVAL CODES **					(Total)
	(0)	(1)	(2)	(3)	(4)	
OCT	379,101	583,063	8,114	212	5,729	976,219
NOV	375,091	565,046	7,694	146	5,691	953,668
DEC	388,795	592,400	8,241	108	6,348	995,892
JAN	393,810	596,904	8,554	174	6,079	1,005,521
FEB	362,694	554,557	7,880	174	5,315	930,620
MAR	399,580	609,354	8,394	180	5,790	1,023,298
APR	395,009	592,728	7,998	212	5,359	1,001,306
MAY	417,352	619,000	8,422	264	5,860	1,050,898
JUN	414,714	610,088	9,002	182	5,997	1,039,983
JUL	426,309	629,996	9,227	290	6,550	1,072,372
AUG	432,244	640,835	8,968	350	6,528	1,088,925
SEP	421,085	608,490	8,491	364	5,842	1,044,272
TOTAL	4,805,784	7,202,461	100,985	2,656	71,088	12,182,974

** -0 Any Carrier. Operation begins and ends out of the US.

-1 Domestic Carrier. Operation begins and ends in the US.

-2 Domestic Carrier. Departure or arrival, but not both, in the US.

-3 Foreign Carrier. Operation begins and ends in the US.

-4 Foreign Carrier. Departure or arrival, but not both, in the US.

TABLE 2.4 SCHEDULED AIRCRAFT OPERATIONS BY ENGINE TYPE

<u>GEOGRAPHIC LOCATION</u>	<u>JT8D</u>	<u>CFM56</u>	<u>ALL ENGINES</u>
United States			
Oct'86 - Sep'87	1,160,091	353,656	1,513,747
Oct'87 - Sep'88	1,082,543	527,431	1,609,974
Oct'88 - Sep'89	1,007,797	697,654	1,705,451
	-----	-----	-----
Three Year Total	3,250,431	1,578,741	4,829,172
Foreign			
Oct'86 - Sep'87	1,057,633	174,206	1,231,839
Oct'87 - Sep'88	1,062,971	302,415	1,365,386
Oct'88 - Sep'89	1,025,228	459,228	1,484,456
	-----	-----	-----
Three Year Total	3,145,832	935,849	4,081,681
Worldwide			
Oct'86 - Sep'87	2,217,724	527,862	2,745,586
Oct'87 - Sep'88	2,145,514	829,846	2,975,360
Oct'88 - Sep'89	2,033,025	1,156,882	3,189,907
	-----	-----	-----
Three Year Total	6,396,263	2,514,590	8,910,853

actual flights flown during the reporting period and are considered reliable. Similar data were not available for the JT8D engine. The JT8D aircraft operations were therefore derived by subtracting the CFM56 aircraft operations from the total aircraft operations for both engines.

The engine manufacturers provided the FAA with a listing of monthly operations counts for their respective engine types; however, the counts did not agree with the OAG counts. Monthly percentages for each engine type were calculated from the engine manufacturer's data and subsequently applied to the JT8D and CFM56 engine totals in Table 2.4 to estimate monthly aircraft operations for the reporting period. Figure 2.1 is a histogram showing the estimated aircraft operations for each engine type.

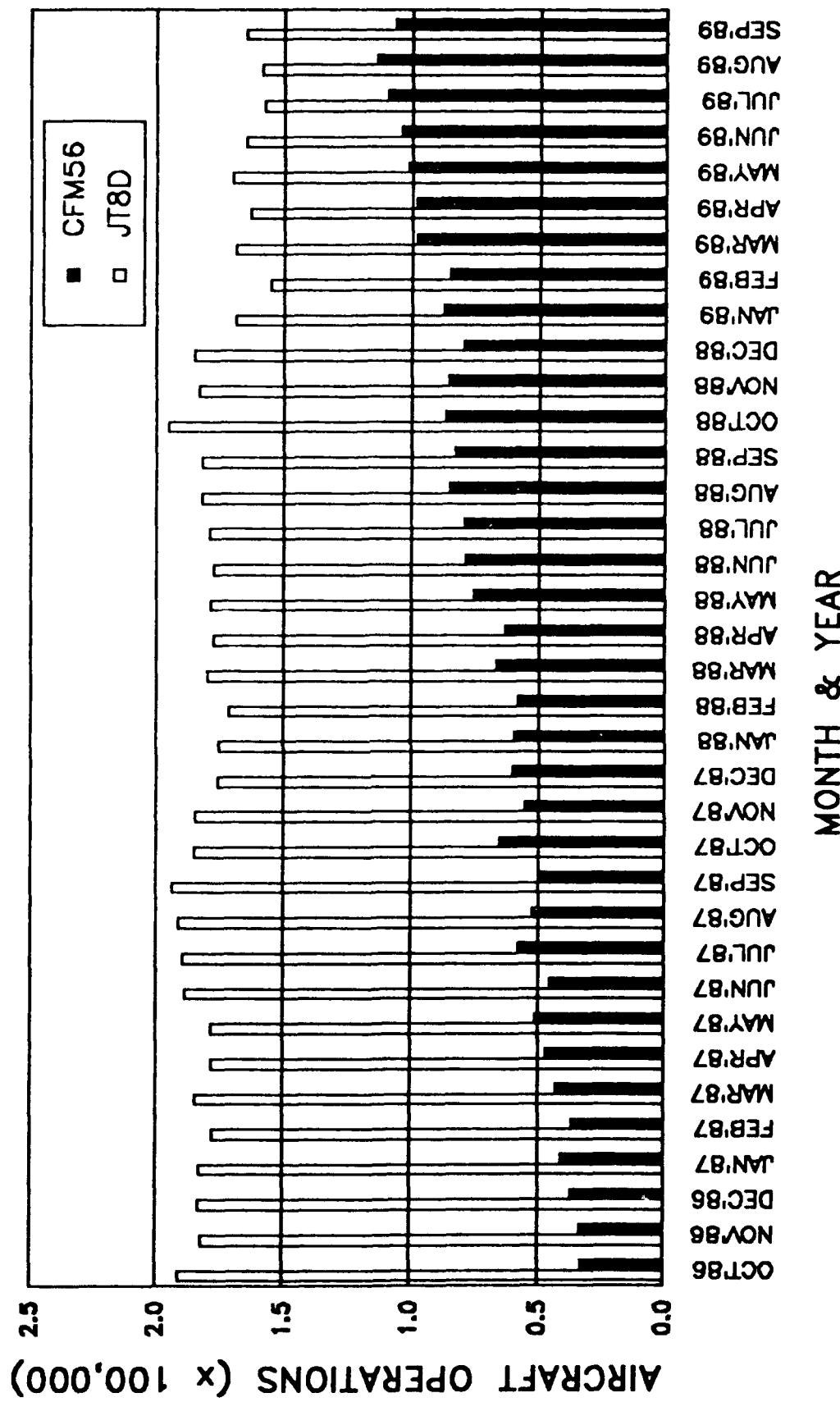


Figure 2.1. Histogram of Monthly Aircraft Operations by Engine Type.

SECTION 3

CHARACTERISTICS OF INGESTED BIRDS

This section provides a description of the birds that were ingested during the data collection period and an analysis of the extent of the bird ingestion threat. The bird-related features that are described in this section include species, weight, seasonal trends, time-of-day trends, and geographic location.

A detailed breakdown of aircraft ingestion events in the United States is presented in Figures 3.1 and 3.2. Figure 3.1 is a contour map of the contiguous United States with the height of the contours being proportional to the number of aircraft ingestion events in each state while Figure 3.2 is a bar chart with the same information plus Alaska and Hawaii. Texas and California have the greatest number of ingestions followed by Hawaii, New York, and Florida.

Table 3.1 provides a tally of all the species that were positively identified by an ornithologist during the collection period. The counts in the US, Foreign, and Overall columns of Table 3.1 indicate the number of aircraft ingestion events in which each bird species was ingested. The species are listed by order and family and it is apparent that the gulls, doves and lapwing/plover families of the order charadriiformes (shorebirds) are the most commonly ingested birds worldwide. The order columbiformes (doves/pigeons) appear to be a bird ingestion problem for the United States while the order falconiformes (hawks/vultures) pose a significant threat abroad.

One of the disappointing features of the B737 bird ingestion data base is the low bird identification rate. The bird species was positively identified in only 157 out of 1,076 aircraft ingestion events that were recorded giving a 14.6 percent identification rate. The identification rate for engine ingestion events in which an engine sustained damage (20.2 percent) was almost two times greater than the identification rate for events which caused no engine damage (11 percent); which could indicate that the group of identified birds is biased to include more birds in the size and weight ranges that tend to damage engines when ingested. Any conclusions about the population of ingested birds should be viewed with the caution that the sample might be more representative of the population of birds that damage engines than of all birds that are ingested.

The species-related descriptions of ingested birds in this report probably provide a conservative view in that the birds that caused damage are better represented in the sample than birds that did not cause damage. The bird features that influence damage cannot be discerned, however, because of the possible bias in the identifications. That is, the differences between the birds that cause damage and the birds that don't cause damage cannot be readily identified since there is less information about the birds that didn't cause damage.

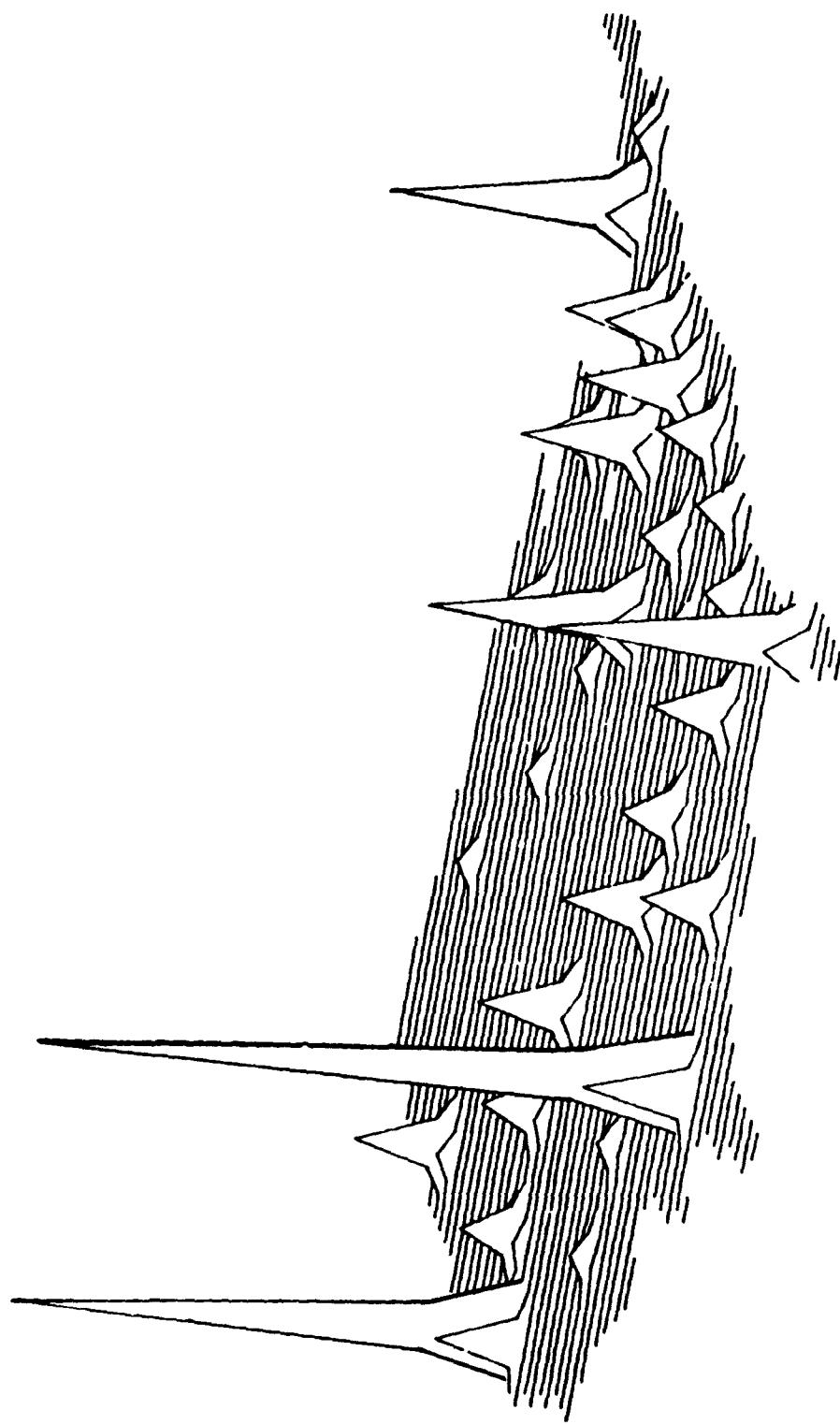


Figure 3.1 Contour Map of Domestic Aircraft Ingestion Events

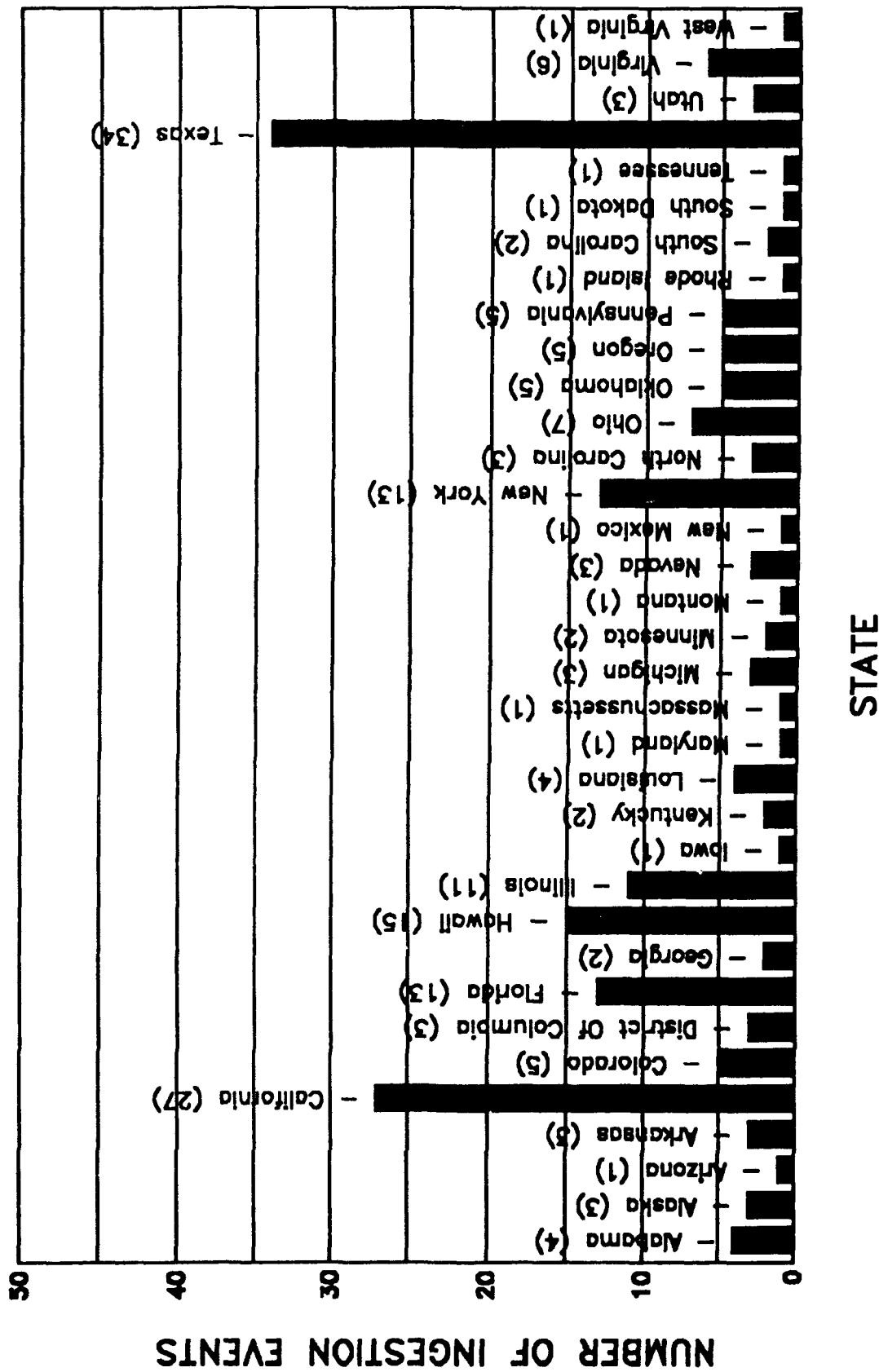


Figure 3.2 Histogram of Bird Ingestion Events by State.

TABLE 3.1
TALLY OF POSITIVELY IDENTIFIED BIRD SPECIES
BROKEN DOWN BY US, FOREIGN, AND OVERALL
(AIRCRAFT INGESTION EVENTS)

Latin Name	Common Name	Species Code	US	Foreign	Overall
<i>Nycticorax nycticorax</i>	Black-crowned night heron	1I124		1	
<i>Bubulcus ibis</i>	Cattle egret	1I135		2	
<i>Egretta alba</i>	Great egret	1I152		2	
<i>Hagedashia hagedash</i>	Hadada ibis	6I12		3	
<i>Chen caerulescens</i>	Snow goose	2J26		2	
<i>Branta canadensis</i>	Canada goose	2J30		2	
<i>Anas americana</i>	American wigeon	2J71		1	
<i>Anas platyrhynchos</i>	Mallard	2J84		1	
<i>Pandion haliaetus</i>	Osprey	2K1		1	
<i>Milvus migrans</i>	Black kite	3K28		1	
<i>Gyps bengalensis</i>	Indian white-backed vulture	3K46		1	
<i>Aegypius monachus</i>	Eurasian black vulture	3K55		1	
<i>Circus cyaneus</i>	Northern marsh harrier	3K78		1	
<i>Accipiter striatus</i>	Sharp-shinned hawk	3K105		1	
<i>Geraeoetus melanoleucus</i>	Gray eagle-buzzard	3K161		1	
<i>Buteo swainsonii</i>	Swainson's hawk	3K171		1	
<i>Buteo buteo</i>	Common buzzard	3K180		1	
<i>Falco sparverius</i>	American kestrel	5K26		1	
<i>Falco tinnunculus</i>	Eurasian kestrel	5K27		1	
<i>Falco berigora</i>	Brown falcon	5K39		1	
<i>Alectoris rufa</i>	Red-legged partridge	4L41		1	
<i>Alectoris barbara</i>	Barbary partridge	4L42		1	
<i>Francolinus francolinus</i>	Black francolin	4L44		1	
<i>Perdix perdix</i>	Hungarian partridge	4L85		1	
<i>Phasianus colchicus</i>	Ring-necked pheasant	4L161		1	
<i>Porsana carolina</i>	Sora	7M84		1	
<i>Haematopus ostralegus</i>	Common oystercatcher	4N1		1	
<i>Vanellus vanellus</i>	Common lapwing	5N1		1	
<i>Vanellus spinosus</i>	Spur-winged plover	5N4		1	
<i>Vanellus melanopterus</i>	Black-winged plover	5N10		1	
<i>Vanellus coronatus</i>	Crowned lapwing	5N11		1	
<i>Vanellus vanellus</i>	Gray-headed lapwing	5N20		2	
<i>Vanellus miles</i>	Masked plover	5N24		2	
<i>Pluvialis apricaria</i>	Eurasian golden plover	5N25		1	
<i>Charadrius vociferus</i>	Killdeer	5N33		1	
<i>Numenius americanus</i>	Long-billed curlew	6N12		1	
<i>Bartramia longicauda</i>	Upland sandpiper	6N13		1	
<i>Gallinago gallinago</i>	Common snipe	6N47		1	
<i>Burhinus capensis</i>	Cape dikkop	9N4		1	
<i>Stercorarius pomarinus</i>	Pomarine jaeger	13N4		1	
<i>Larus delawarensis</i>	Ring-billed gull	14N12		1	
<i>Larus canus</i>	Common gull	14N13		3	
<i>Larus argentatus</i>	Herring gull	14N14		2	

TABLE 3.1 (CONCLUDED)
TALLY OF POSITIVELY IDENTIFIED BIRD SPECIES
BROKEN DOWN BY US, FOREIGN, AND OVERALL
(AIRCRAFT INGESTION EVENTS)

Latin Name	Common Name	Species Code	US	Foreign	Overall
<i>Larus marinus</i>	Great black-backed gull	14N21		1	
<i>Larus glaucescens</i>	Glaucous-winged gull	14N22		2	
<i>Larus cirrocephalus</i>	Gray-headed gull	14N29		1	
<i>Larus maculipennis</i>	Brown-hooded gull	14N35		2	
<i>Larus ridibundus</i>	Common black-headed gull	14N36	10		
<i>Larus philadelphia</i>	Bonaparte's gull	14N38	1		
<i>Columba livia</i>	Common rock dove	2P1	11		
<i>Columba guinea</i>	African speckled pigeon	2P4			
<i>Pterocles gutturalis</i>	Common wood-pigeon	2P9			
<i>Streptopelia turtur</i>	Common turtle dove	2P50			
<i>Streptopelia chinensis</i>	Spotted dove	2P65			
<i>Geopelia striata</i>	Zebra dove	2P102			
<i>Geopelia humeralis</i>	Bar-shouled dove	2P103			
<i>Zenaidura macroura</i>	American mourning dove	2P105			
<i>Cacatua roseicapilla</i>	Galah	1Q15			
<i>Ruwenzoriorhynchus johnstoni</i>	Ruwenzori tui	2R15			
<i>Coccycuza americana</i>	Tuaco	2R51			
<i>Tyto alba</i>	Yellow-billed cuckoo	1S2			
<i>Speotyto cunicularia</i>	Common barn owl	2S102			
<i>Chordeiles minor</i>	Burrowing owl	5T5			
<i>Chaetura pelasgica</i>	Nighthawk	1U33			
<i>Apus apus</i>	Chimney swift	1U55			
<i>Aeronauta saxatalis</i>	Common swift	1U71			
<i>Eremophila alpestris</i>	White-throated : wift	17Z74			
<i>Progne subis</i>	Horned lark	18Z12			
<i>Sturnus vulgaris</i>	Purple martin	12Z12			
<i>Corvus corone</i>	Common starling	21Z75			
<i>Cathartes ustulatus</i>	Carriion crow	22Z94			
<i>Turdus merula</i>	Swainson's thrush	41Z246			
<i>Turdus philomelos</i>	Common blackbird	41Z269			
<i>Icteria virens</i>	Common song thrush	41Z282			
<i>Sturnella neglecta</i>	Yellow-breasted chat	6Z269	1		
<i>Zonotrichia albicollis</i>	Western meadowlark	64Z68	1	2	
	White-throated sparrow	68Z218	1	1	
					157
					93
					64

TABLE 3.2 WEIGHT DISTRIBUTION OF INGESTED BIRDS* BY ORIGIN

* Counted by Engine Ingestion Events

Table 3.2 is a frequency table of weights for the positively identified birds. The bird weights are derived from the species identification and when possible are adjusted for the age and sex of the ingested bird. The modes in Table 3.2 therefore represent the weights of the more commonly identified bird species that were ingested. Figure 3.3 provides the same information in the form of a histogram. Most of the ingested birds (75.4 percent) that were identified in this study weighed less than or equal to 20 ounces; however, 8.4 percent weighed more than 20 ounces and less than or equal to 32 ounces and 16.2 percent of the identified birds weighed more than 2 pounds.

Summary statistics calculated from the raw data for the United States, foreign, and worldwide bird weight distributions are presented in Table 3.3. Note that the weight of 1 ingested bird per event is included in the bird weight distribution for multiple bird engine ingestion events. The mean, median, and mode are three different concepts for the typical or average value which measures the central tendency of the distribution. The mean bird weight is the sum of the weights for all ingestion events divided by the number of events included in the sum. The median weight divides the weights into two groups with half the weights below the median and half above. The mode of the bird weights is the weight that has the highest frequency in the data set. The median and mode are more relevant measures of the average for the bird ingestion problem. The mean weight would be important if damage were related to the cumulative weight of all birds ingested by a single engine since the mean is based on the total weight of the ingested birds.

A pattern suggestive of a sine function is seen in Figure 3.4 which is a bar chart of monthly bird ingestions for the data collection period. The cyclic pattern in aircraft ingestion events reflects seasonal bird activity. The start of a cyclic pattern is also seen in the ingestion rate data which indicates that the trends are due to the changing bird population and not changes in air traffic activity. Time trends in bird ingestions are further investigated on a seasonal basis in the following paragraphs.

The seasonal bird ingestion rates for the Northern and Southern Hemispheres, the United States and foreign countries, and the whole world are presented in the bar chart of Figure 3.5. Here the ingestion rates are not being compared by engine type so the ingestion rate R is simply calculated as:

$$R = \text{Ing} \cdot \frac{10000}{\text{Ops}} \quad (3.1)$$

where Ing is the number of ingestions and Ops is the number of aircraft operations in the time period being considered. The rate is expressed as ingestions per 10,000 aircraft operations.

Seasonal trends were investigated using a Chi-squared goodness-of-fit (GOF) analysis. The Chi-squared value for testing the hypothesis that the number of aircraft ingestion events does not vary with the seasons is 101.4. The critical value for testing at the five percent level of significance is 7.81 while the 0.5 percent level is 12.8; therefore, the high value of the test statistic is a very strong indication that ingestions do vary with the seasons.

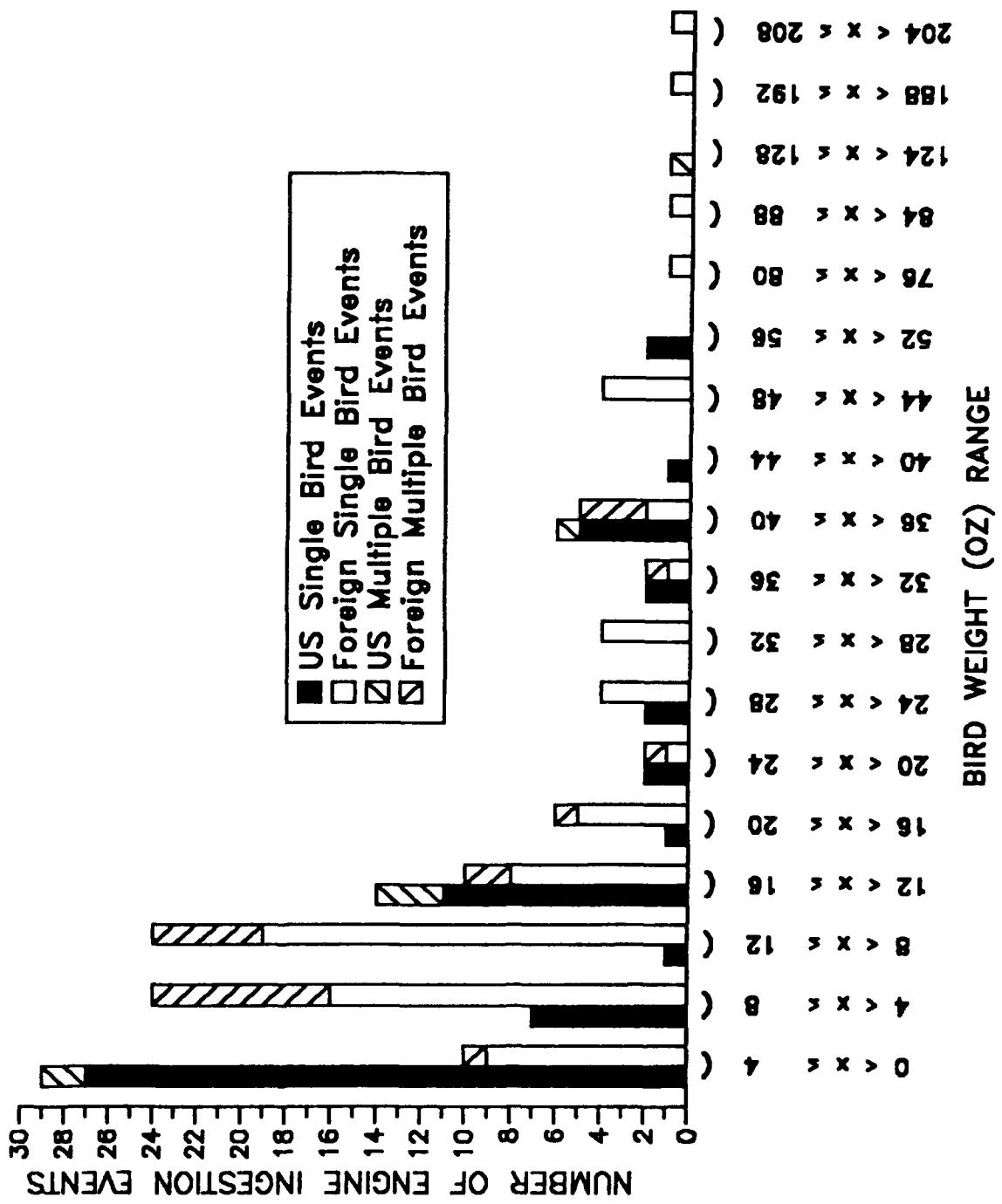


Figure 3.3. Histogram of Number of Birds Ingested by Weight Class.

TABLE 3.3 SUMMARY STATISTICS FOR INGESTED BIRD WEIGHTS

* STATISTIC	United States						Foreign						Worldwide						Multiple Bird Events					
	Multiple Bird Events			Single Bird Events			Total Bird Events			Multiple Bird Events			Single Bird Events			Total Bird Events			Multiple Bird Events			Single Bird Events		
	Events	Bird	Total	Events	Bird	Total	Events	Bird	Total	Events	Bird	Total	Events	Bird	Total	Events	Bird	Total	Events	Bird	Total	Events	Bird	Total
NUMBER OF EVENTS**	7	61	68		22	77		99	29		138	167												
MODE(S)	14.	4.	14.		11.5	9.7		9.7	14.		40.	40.												
MEDIAN	14.	6.	6.		10.1	10.		10.1	11.5		9.7	10.												
MEAN (AVERAGE)	30.9	13.6	15.4		15.3	21.7		20.3	19.0		18.1	18.3												
STD DEVIATION	44.58	14.87	20.10		12.29	33.52		30.19	24.19		27.15	26.59												

* Bird Weights Given in Ounces

** Counted by Engine Ingestion Events

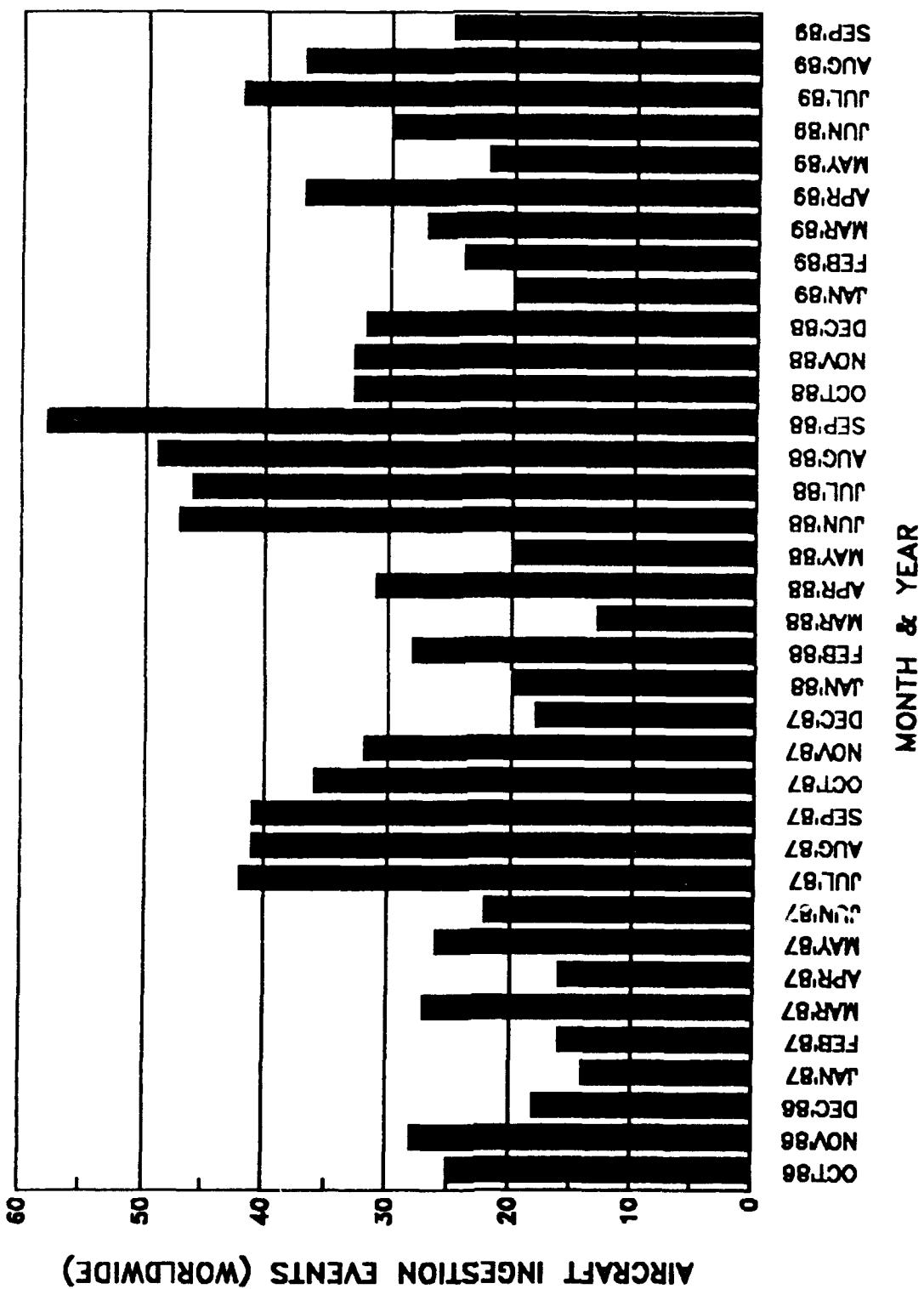


Figure 3.4 Bar Chart of Worldwide Aircraft Ingestion Events.

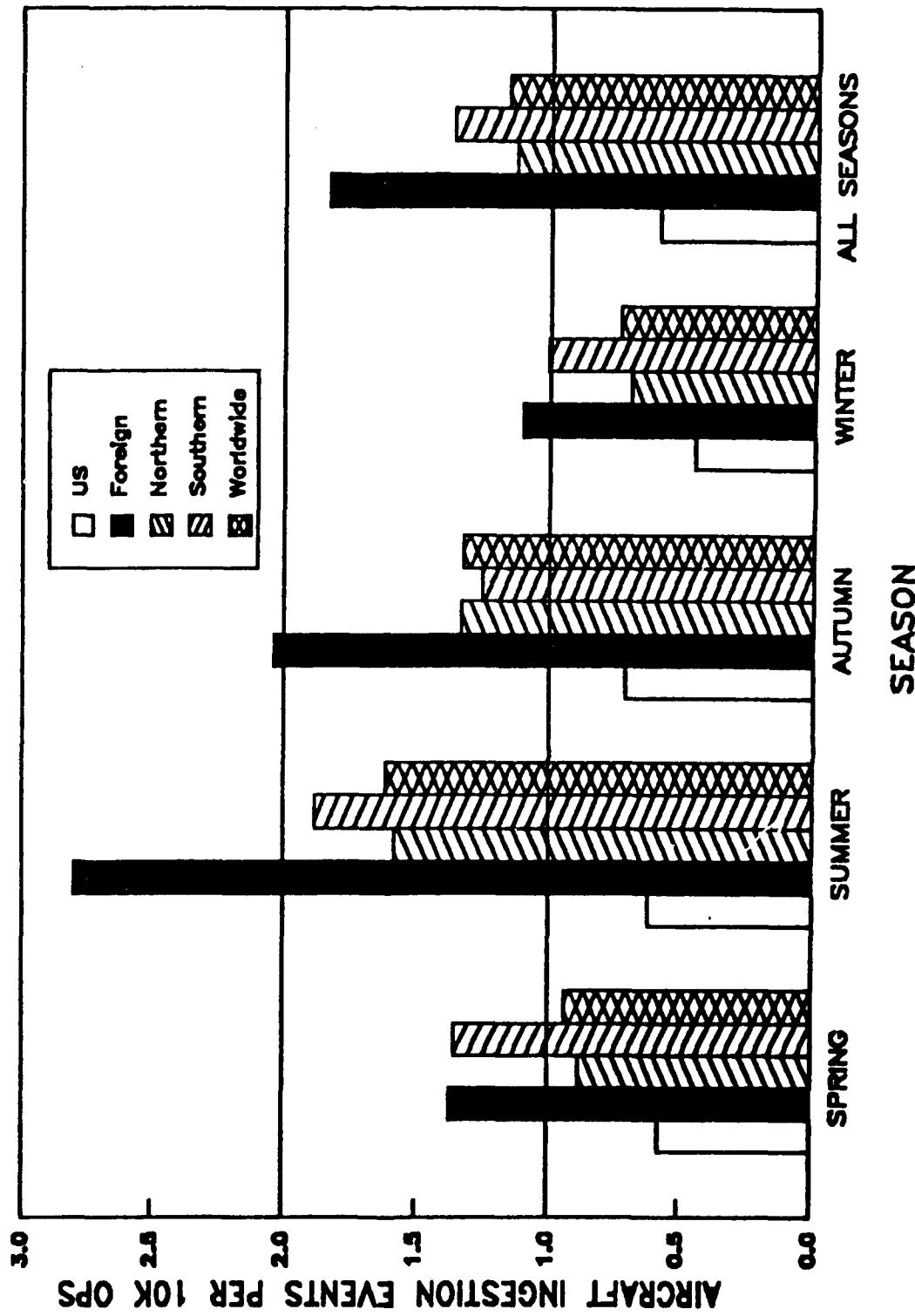


Figure 3.5 Seasonal Aircraft Ingestion Rates.

The winter data were eliminated in an effort to better identify the nature of the differences between the seasons. Testing for the equality of the ingestions for spring, summer and autumn also yields a significant difference with a test statistic of 45.72 and a five percent critical value of 5.99 which is also a very strong indication that ingestions vary between spring, summer, and autumn. Further testing between summer and autumn produces a test statistic of 10.66 which is also much larger than the 5 percent critical value of 3.84 for comparing 2 groups. Ingestion rates are highest in the summer, slightly lower in the fall, followed by spring, with lowest incidence of ingestions in the winter.

The time of day distribution of bird ingestion events is illustrated in Figure 3.6 with time of day reduced to the four basic segments of morning, mid-day, evening and night. There is a noticeable drop in the number of ingestions at night and the Chi-squared test for equality of the four time periods indicates that they are not the same. The Chi-squared test statistic is 48.22 while the 99th percentile of the Chi-squared with three degrees of freedom distribution is 11.34.

There are two likely reasons for a drop in ingestions during the night. Birds are not generally nocturnal so that bird activity is reduced at night. Also, there are fewer flights scheduled at night. A lessened exposure due to fewer flights and fewer birds results in a reduction in the number of ingestions at night.

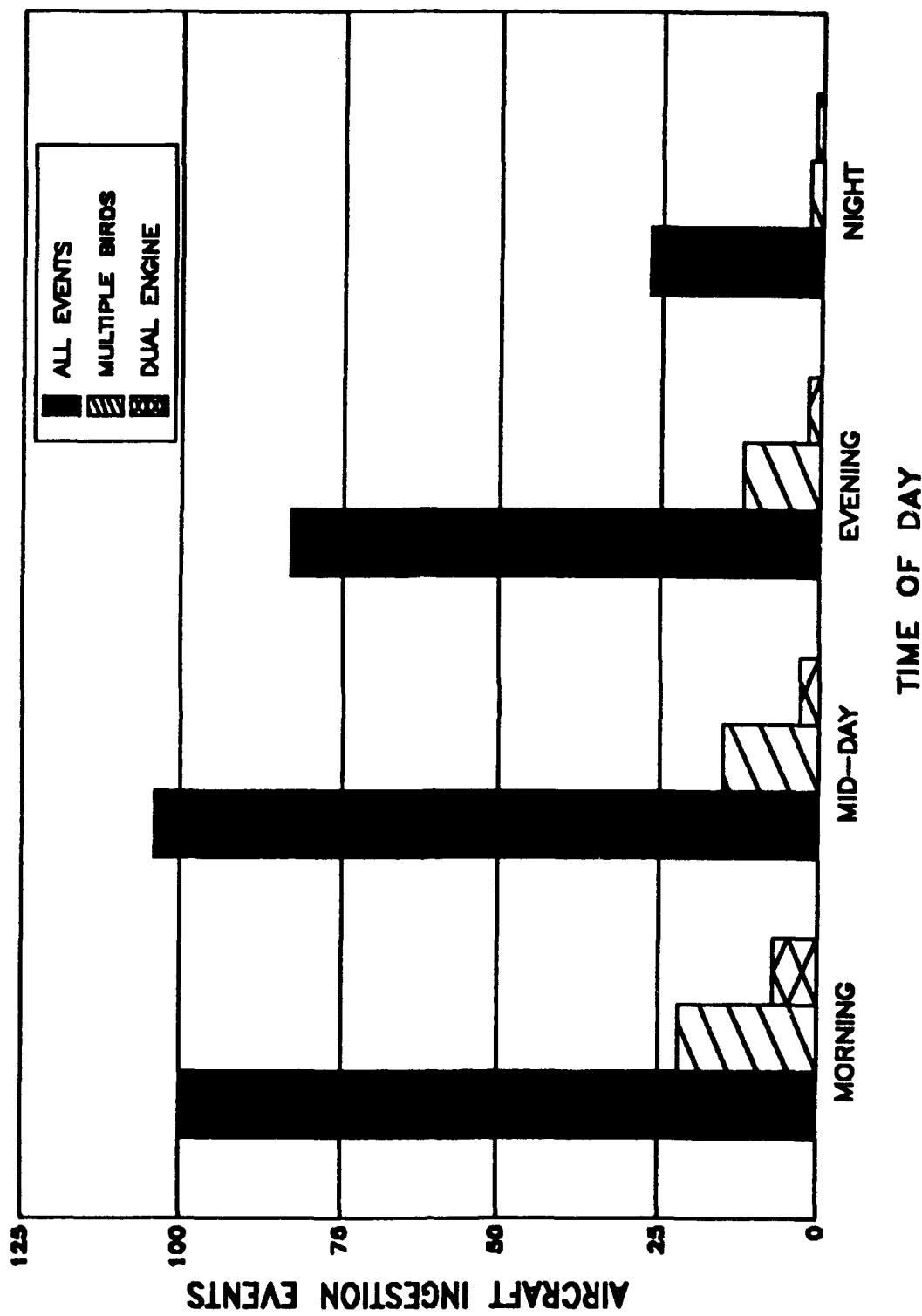


Figure 3.6 Histogram of Aircraft Ingestion Events by Time of Day.

SECTION 4

INGESTION RATES

This section describes the rates at which bird ingestions occurred during the 3-year collection period covered in this report. The Poisson distribution is commonly used to describe how events are randomly scattered in time, and the bird ingestion data are shown to agree with the assumptions of a Poisson process. The first part of this section provides the estimates of the basic ingestion rates. The second part describes the Poisson distribution and how it relates to the bird ingestion events. The final parts discuss statistical analyses based on the assumption that bird ingestions follow a Poisson process.

4.1 INGESTION RATE ESTIMATES.

This sub-section provides a general description of ingestion rates broken down by location, engine, and phase of flight. The rates are given in terms of ingestions per 10,000 aircraft operations and have been adjusted to the inlet area of the engine to allow size independent comparisons between engines. The inlet area used throughout this report is called the "fat lip area" and was specified by the Boeing Company for each type of engine installation. A more detailed statistical analysis of ingestion rates is covered in the next section using statistical techniques for Poisson processes.

Table 4.1A lists the United States, foreign, and worldwide ingestion rates for both the JT8D and the CFM56 engines as well as a composite rate for all 737 aircraft. The inlet area adjustment was done using a 10-square-foot unit area on the basis of the total inlet area of both engines to keep the rates in a reasonable range. The composite rates in each geographical region are weighted means of the inlet area adjusted rates for the individual engines and are determined as follows: the number of ingestions per 10 square feet inlet area for each engine is projected by multiplying the rates by the number of aircraft operations. The composite rates are calculated by dividing the total projected ingestions for both engines by the total aircraft operations for the geographical region. Table 4.1B lists engine ingestion rates based on engine operations and normalized for the engine inlet area. The numbers in parentheses in Tables 4.1A and 4.1B reflect the number of ingestions where geographic location and/or engine type was not known.

The ingestion rates for the CFM56 engine were calculated using reported aircraft operations for specific geographical regions. The ingestion rates for the JT8D engine were calculated using estimated aircraft operations for specific geographical regions. The details of the calculation were presented in Section 3, equation 3.1.

Figure 4.1 shows monthly ingestion rates subdivided by engine type and adjusted for inlet area so that a comparison between engine types can be made. The adjusted monthly ingestion rate (R_{adj}) for an engine type is expressed as ingestions per 10 ft² per 10,000 aircraft operations is calculated as:

$$R_{adj} = \text{Ing} \cdot \frac{1440}{2IA} \cdot \frac{10000}{\text{Ops}} \quad (4.1)$$

TABLE 4.1A
BREAKDOWN OF BIRD INGESTION RATES BY ENGINE AND LOCATION
(BASED ON AIRCRAFT OPERATIONS)

ENGINE TYPE:	JT8D	CFM56	ALL ENGINES
INLET AREA: *	2234 in ²	4606 in ²	N/A
UNITED STATES			
Aircraft Ingestion Events	132	147	284 (5)
OAG Aircraft Operations	3,250,431	1,578,741	4,829,172
Ingestion Rate (Ing/10K Ops)	0.41	0.93	0.59
Normalized Ingestion Rate (Ing/10K Ops/10ft ²)	0.26	0.29	0.27
FOREIGN			
Aircraft Ingestion Events	572	218	790
OAG Aircraft Operations	3,145,832	935,849	4,081,681
Ingestion Rate (Ing/10K Ops)	1.82	2.33	1.94
Normalized Ingestion Rate (Ing/10K Ops/10ft ²)	1.17	0.73	1.07
WORLDWIDE			
Aircraft Ingestion Events	705 (1)	366 (1)	1,076 (7)
OAG Aircraft Operations	6,396,263	2,514,590	8,910,853
Ingestion Rate (Ing/10K Ops)	1.10	1.46	1.21
Normalized Ingestion Rate (Ing/10K Ops/10ft ²)	0.71	0.46	0.64

*Total Area for 2 Engines

TABLE 4.1B
BREAKDOWN OF BIRD INGESTION RATES BY ENGINE AND LOCATION
(BASED ON ENGINE OPERATIONS)

ENGINE TYPE:	JT8D	CFM56	ALL ENGINES
INLET AREA:	1117 in ²	2303 in ²	N/A
<u>UNITED STATES</u>			
Engine Ingestion Events	137	153	295 (5)
OAG Engine Operations	6,500,862	3,157,482	9,658,344
Ingestion Rate (Ing/10K Ops)	0.21	0.48	0.31
Normalized Ingestion Rate (Ing/10K Ops/10ft ²)	0.27	0.30	0.28
<u>FOREIGN</u>			
Engine Ingestion Events	583	227	810
OAG Engine Operations	6,291,664	1,871,698	8,163,362
Ingestion Rate (Ing/10K Ops)	0.93	1.21	0.99
Normalized Ingestion Rate (Ing/10K Ops/10ft ²)	1.19	0.76	1.09
<u>WORLDWIDE</u>			
Engine Ingestion Events	721 (1)	381 (1)	1,107 (7)
OAG Engine Operations	12,792,526	5,029,180	17,821,706
Ingestion Rate (Ing/10K Ops)	0.56	0.76	0.62
Normalized Ingestion Rate (Ing/10K Ops/10ft ²)	0.73	0.47	0.66

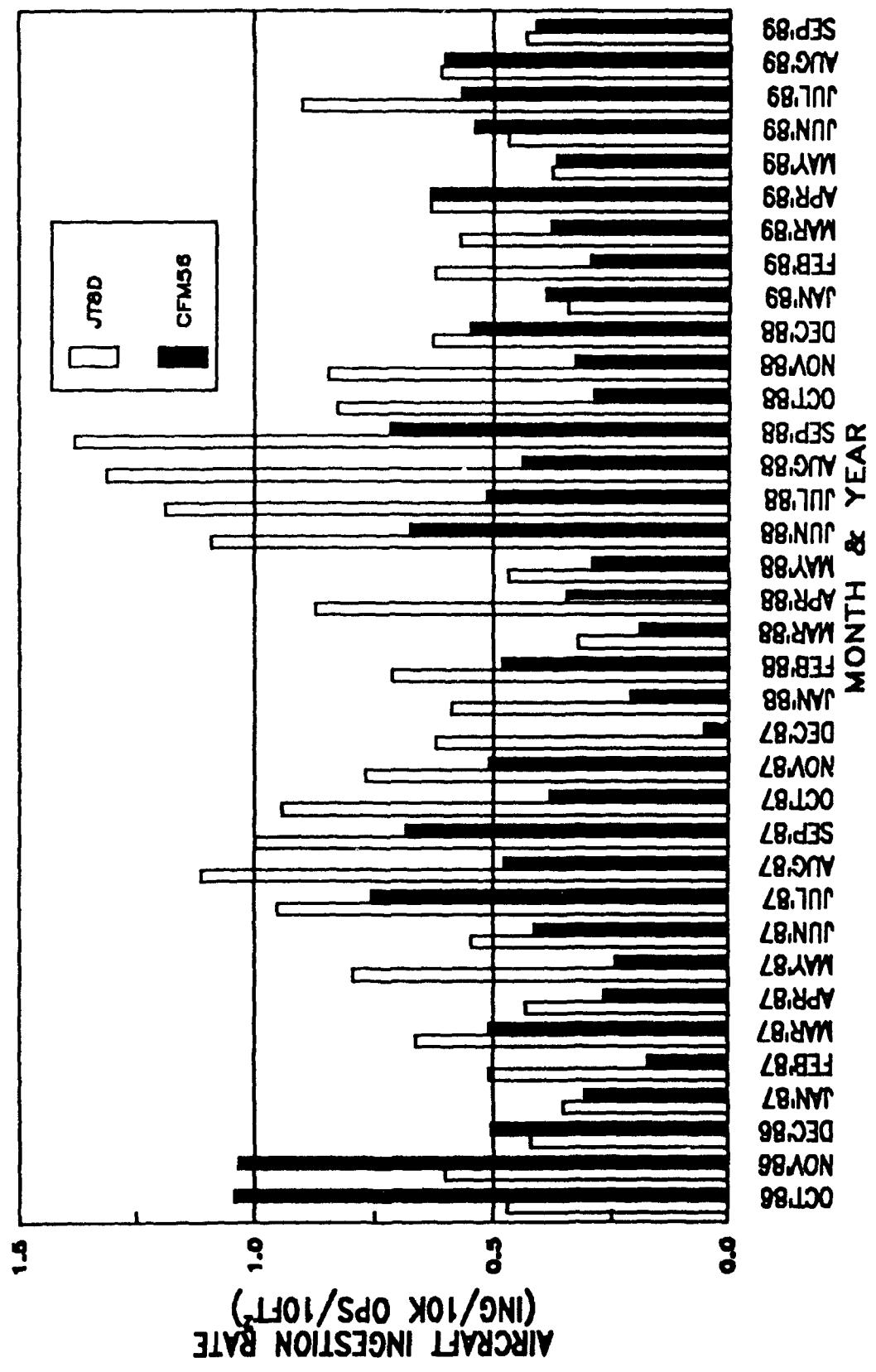


Figure 4.1. Histogram of Monthly Aircraft Ingestion Rates by Engine Type.

where I_{ng} is the number of monthly aircraft ingestion events for an engine type, I_A is the inlet area (in^2) of the engine type, and Ops is the number of aircraft operations for the month. Twice the engine area is used because there are two engines on each B737 aircraft. The constant 1440 is the factor for converting square inches to units of 10-square-foot areas.

The phase of flight ingestion rate tabulation is presented in Table 4.2A. The method used to calculate ingestion rate 1 is expressed in Equation 3.1. The area adjustment used for ingestion rate 2 is implemented using Equation 4.1. The highest ingestion rates were in the take-off and landing phases followed by the climb and approach phases. There were very few ingestions during the taxi and cruise phases of flight. This pattern is typically seen in bird strike and bird ingestion studies and is indicative of the fact that airports are often located in desirable bird environs. Since birds congregate around airports, there is a greater chance of striking or ingesting a bird during the phases of flight that take place close to the airports. Also, commercial airline cruise routes are well above the altitude in which birds are usually found. Table 4.2B lists engine ingestion rates as a function of phase of flight. The differences in ingestion rates between Tables 4.2A and 4.2B are due to multiple engine ingestion events.

4.2 THE POISSON PROCESS.

The Poisson process is the simplest type of stochastic process which describes how events are distributed in time. The Poisson process is here taken to govern aircraft ingestion events, and the times at which they occur are random. In a Poisson process the events are distributed somewhat evenly in time so that it appears that the times at which the events occurred form a uniform distribution. This section describes some of the properties of Poisson processes that will be useful in describing bird ingestions and in testing hypotheses about bird ingestion rates.

The basis of a Poisson process is a description of the probability distribution of the number of events that occur in a given time interval. The formula for the probability of n events in an interval of length T is:

$$P(X(T)=n) = \frac{e^{-\lambda T} (\lambda T)^n}{n!} \quad (4.2)$$

The parameter λ is the mean rate at which events occur and the mean number of events in the length T time interval is λT . The time scale that will be used in this study is number of aircraft operations. Ingestion rates are typically reported in events per 10,000 aircraft operations which implies the use of aircraft operations as the time scale in a Poisson process.

One derivation of the formula for the Poisson distribution is the limiting distribution of the binomial distribution for large sample sizes. If we assume that the probability of a bird ingestion is the same from flight to flight, then the number of ingestions in a large number of flights has a binomial distribution. If the probability of ingestion is p and the number of flights is N then the probability that n ingestions occur in the N flights is:

$$P(X(N)=n) = \binom{N}{n} p^n (1-p)^{(N-n)} \quad (4.3)$$

TABLE 4.2A INGESTION RATES FOR ENGINE TYPE BY PHASE OF FLIGHT
(BASED ON AIRCRAFT INGESTION EVENTS)

	PRATT-WHITNEY JT8D	CFMI CFM56	ALL ENGINES*
INLET **	2234 in ²	4606 in ²	---
AREA			
AIRCRAFT OPERATIONS	6,396,263	2,514,590	8,910,853
PHASE OF FLIGHT	AIRCRAFT *** EVENTS RATE ₁	AIRCRAFT *** ING. INGEST† RATE ₂	AIRCRAFT *** ING. INGEST† RATE ₁ RATE ₂
Taxi	6 .009	.006	4 .016 .005
Takeoff	437 .683	.440	154 .612 .191
Climb	41 .064	.041	53 .211 .066
Cruise	3 .005	.003	15 .060 .019
Approach	42 .066	.042	41 .163 .051
Landing	175 .274	.176	99 .394 .123
Other	1 .002	.001	0 --- ---
All Phases	705 1.102	.710	366 1.456 .455

* Includes Only Events Where Engine Type Known

** Total Area of 2 Engines

*** Contains Proprated Apportionment of Events with Unknown Phase of Flight
† Ingestion Events Per 10,000 Operations

†† Ingestion Events Per 10,000 Operations Per 10 ft²

††† Function of JT8D Rate 2, CFM56 Rate 2, and Corresponding Operations

TABLE 4.2B INGESTION RATES FOR ENGINE TYPE BY PHASE OF FLIGHT
(BASED ON ENGINE INGESTION EVENTS)

	<u>PRATT-WHITNEY JT8D</u>	<u>CFMI CFM56</u>	<u>ALL ENGINES*</u>
INLET AREA	11117 in ²	2303 in ²	---
ENGINE OPERATIONS	12,792,526	5,029,180	17,821,706
PHASE OF FLIGHT	ENGINE ** ING. EVENTS RATE 1	ENGINE ** INGEST† RATE 1	ENGINE ** INGEST† RATE 1
	INGEST‡ RATE 2	EVENTS RATE 2	EVENTS RATE 2
Taxi	6 .004	.006	.008
Takeoff	4 .335	.432	.324
Climb	4.2 .031	.040	.105
Cruise	3 .002	.003	.030
Approach	4.3 .032	.041	.087
Landing	177 .132	.170	.203
Other	1 .001	.001	---
All Phases	721 .538	.694	.758
	RATE 2	RATE 2	RATE 2

* Includes Only Events Where Engine Type Known

** Contains Proportioned Apportionment of Events with Unknown Phase of Flight

† Ingestion Events Per 10,000 Operations

‡ Ingestion Events Per 10,000 Operations Per 10 ft²

†† Function of JT8D Rate 2, CFM56 Rate 2, and Corresponding Operations

The binomial probabilities in Equation 4.3 can be approximated by a Poisson distribution with mean Np for large values of N . That is, the single flight probability of an ingestion, p , replaces λ in Equation 4.2.

An important question that can be investigated through the Poisson process model of bird ingestions is the influence of inlet area on the ingestion rates. Past studies [6,7] in bird strikes have used the assumption that the probability of a bird strike is proportional to the cross sectional area of the aircraft. Applying the same concept to engines implies that the bird ingestion rate should be proportional to the inlet area of the engine.

The inlet area effect can be incorporated into the Poisson process model by letting the parameter λ represent the ingestion rate per unit area. The probability of n ingestions in N operations for an engine with inlet area A is:

$$P(X(N)=n) = \frac{e^{-\lambda AN}}{n!} (\lambda AN)^n. \quad (4.4)$$

4.3 VALIDITY OF THE POISSON PROCESS MODEL FOR BIRD INGESTIONS.

The applicability of the Poisson process model can be tested by analyzing the times between ingestions. The interarrival times in a Poisson process are random variables that have independent exponential distributions, and the mean time between arrivals is the reciprocal of the ingestion rate. The validity of the Poisson process model can be tested by applying a goodness-of-fit (GOF) test for the exponential distribution to the times between ingestions.

The times between ingestions are measured by the number of days between aircraft ingestion events. Normally the number of aircraft operations between aircraft ingestion events would be used; however it is impossible to measure this directly. The number of days between aircraft ingestion events provides a suitable measure of the time between ingestions since daily aircraft operations are reasonably consistent.

The GOF test for the exponential distribution is a modified Kolmogorov-Smirnov (K-S) test comparing the observed cumulative distribution function (CDF) to the predicted exponential CDF based on the sample mean. The K-S test uses the test statistic D defined as the maximum distance between the observed and predicted cumulative distribution functions. A modification to the critical values for the test statistic is required when the predicted CDF is derived from the mean of the sample. The critical values for the modified K-S test were computed by Liliefors [8]. The critical value for a 0.05 level of significance when the sample size, n , is larger than 30 can be approximated by $1.06/\sqrt{n}$.

The modified K-S test was run on six subgroups of the data broken down by engine and location. The six groups were (1) domestic (United States) JT8D, (2) contiguous United States JT8D, (3) foreign JT8D, (4) domestic CFM56, (5) contiguous United States CFM56, and (6) foreign CFM56. Figures 4.2 through 4.7 compare the observed and predicted cumulative distributions for each of the six groups, respectively. In each case there is a very close visual agreement between the observed and predicted CDF's.

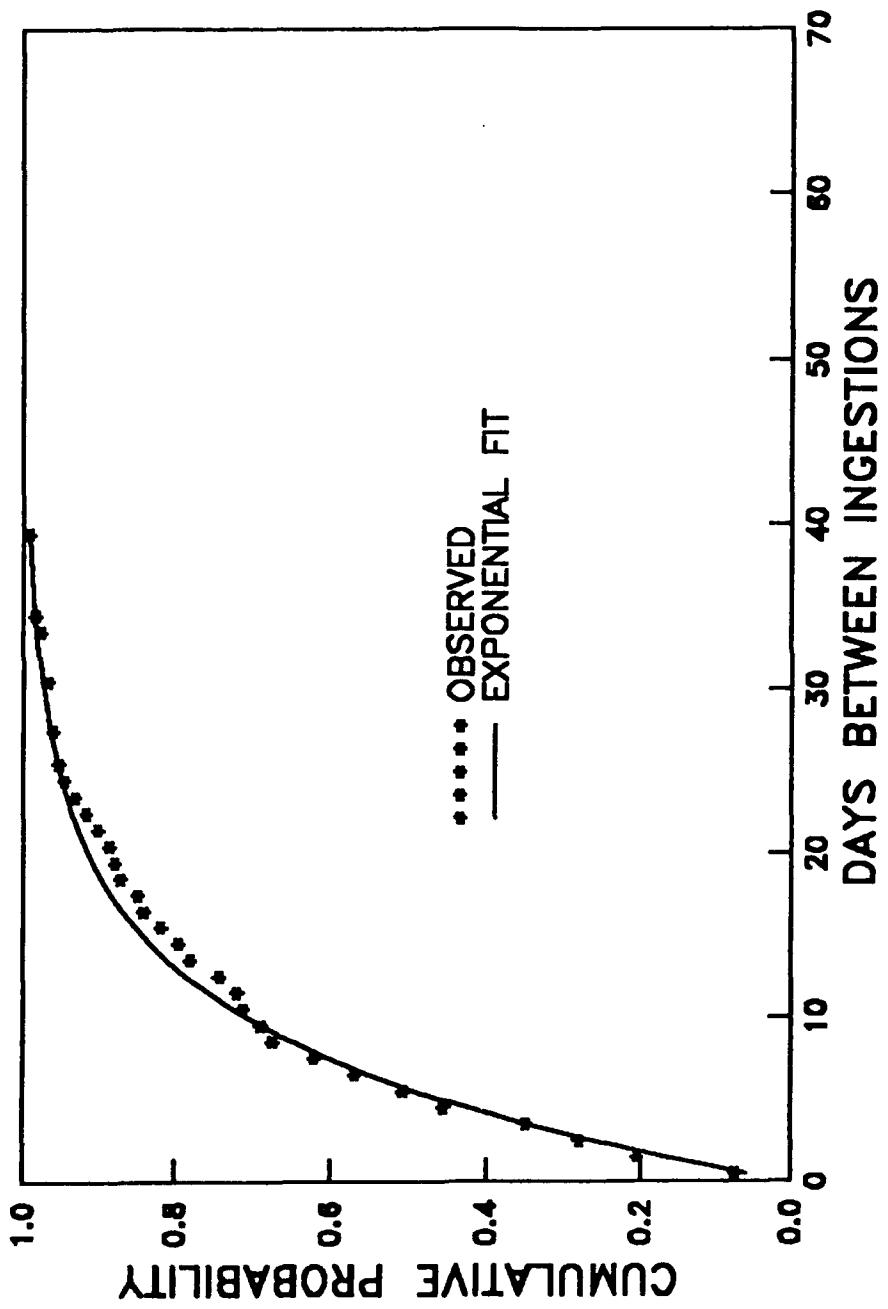


Figure 4.2 Comparison of Observed and Predicted CDFs for United States JT8D Aircraft Ingestion Events.

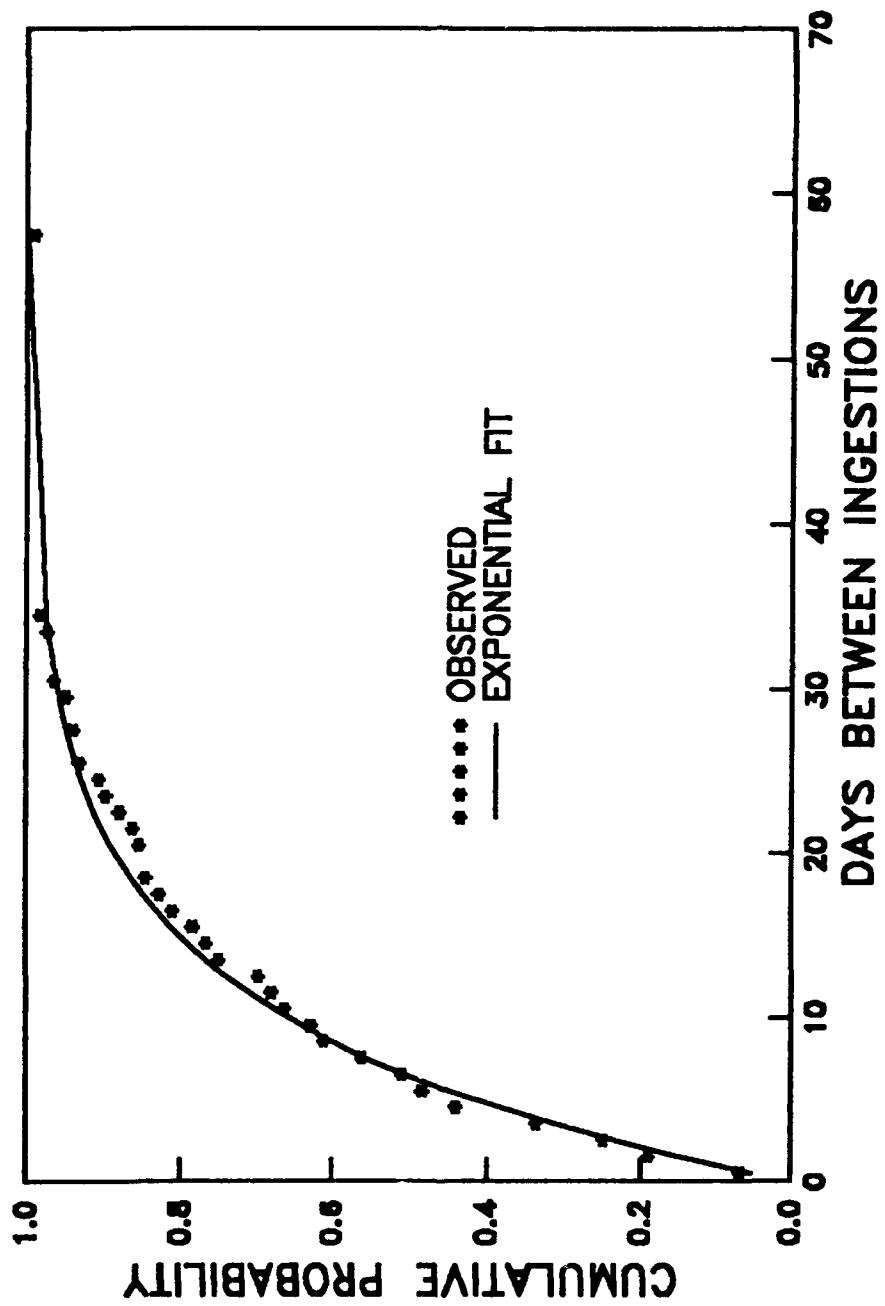


Figure 4.3 Comparison of Observed and Predicted CDFs for Contiguous United States JT8D Aircraft Ingestion Events.

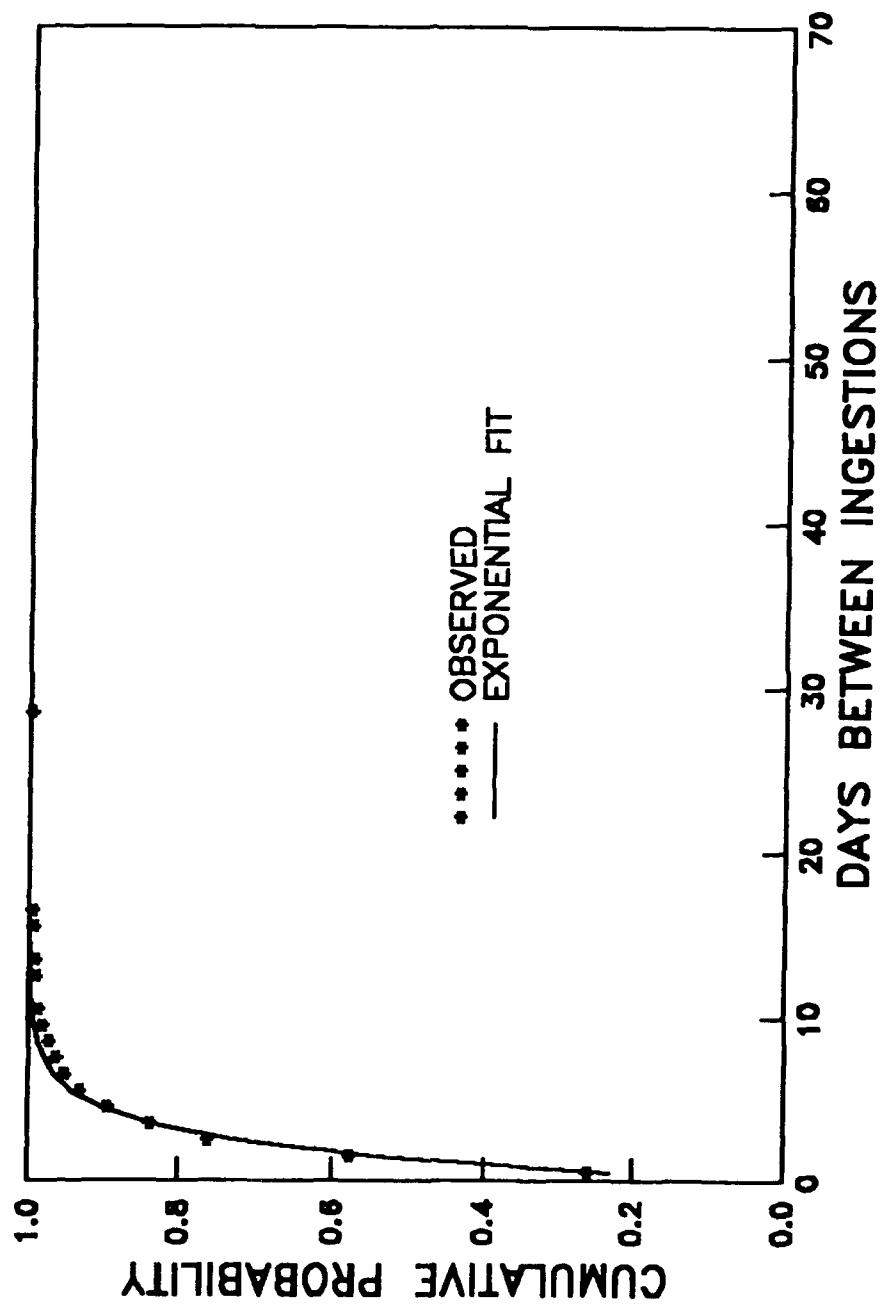


Figure 4.4 Comparison of Observed and Predicted CDFs for Foreign Aircraft Ingestion Events.

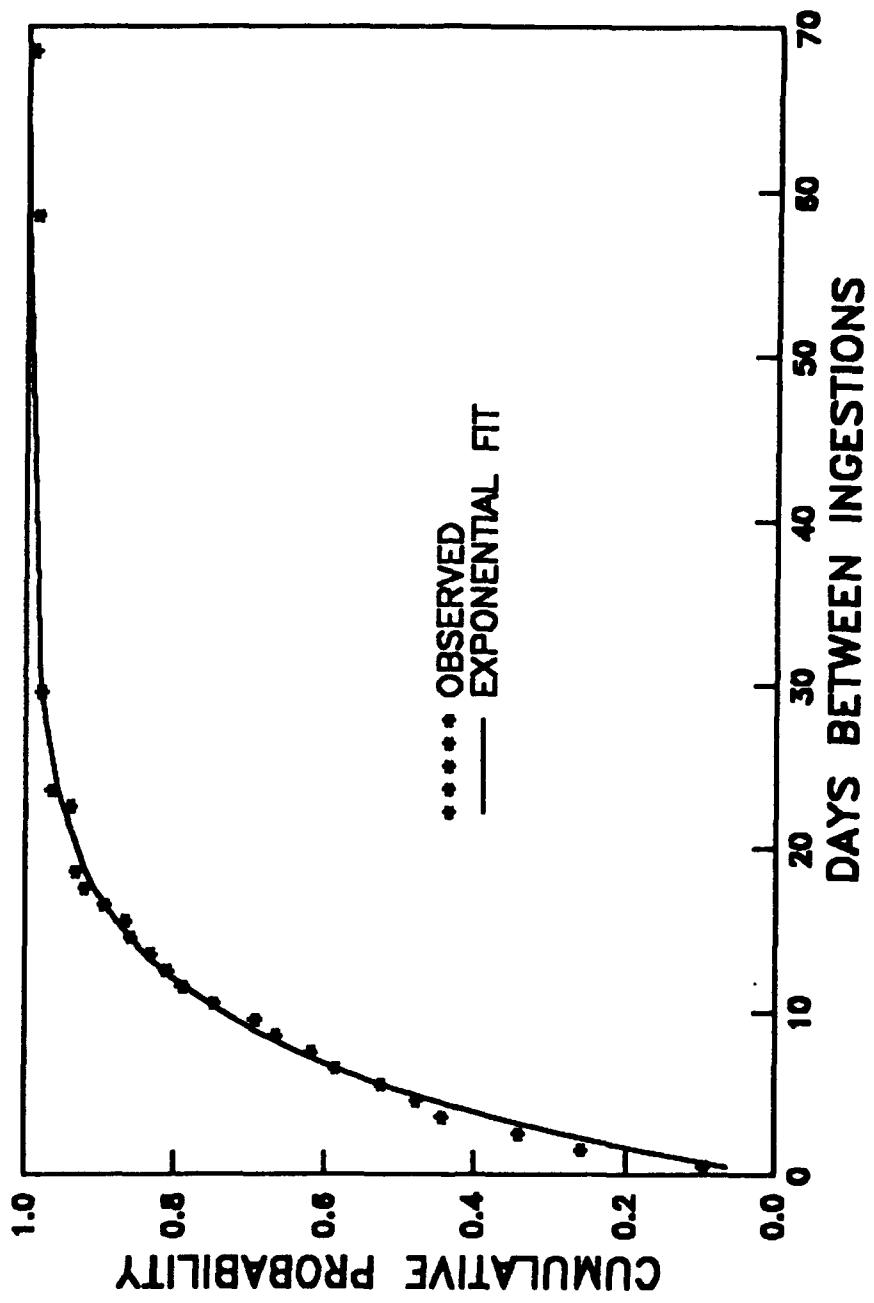


Figure 4.5 Comparison of Observed and Predicted CDFs for United States CFM56 Aircraft Ingestion Events.

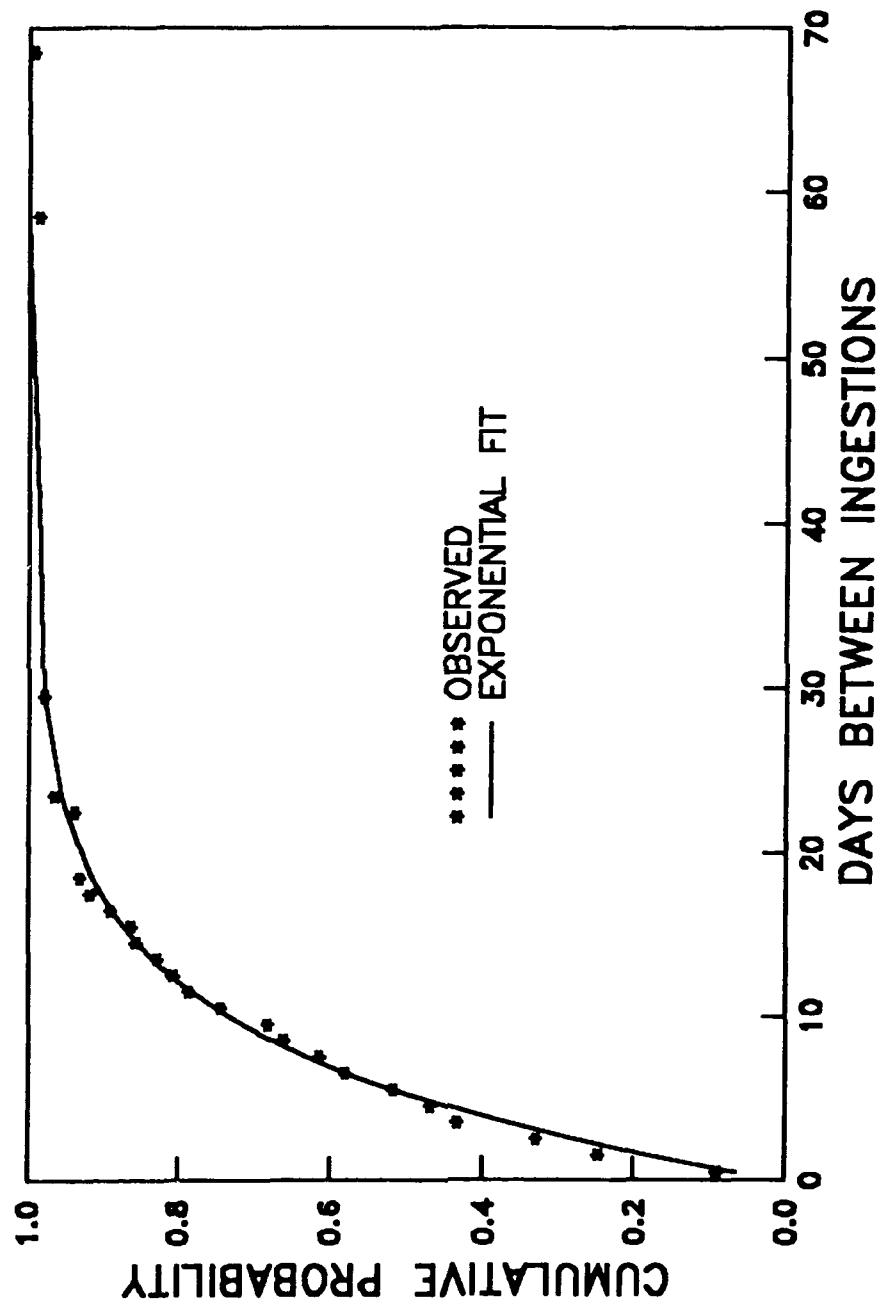


Figure 4.6 Comparison of Observed and Predicted CDFs for Contiguous United States CFM56 Aircraft Ingestion Events.

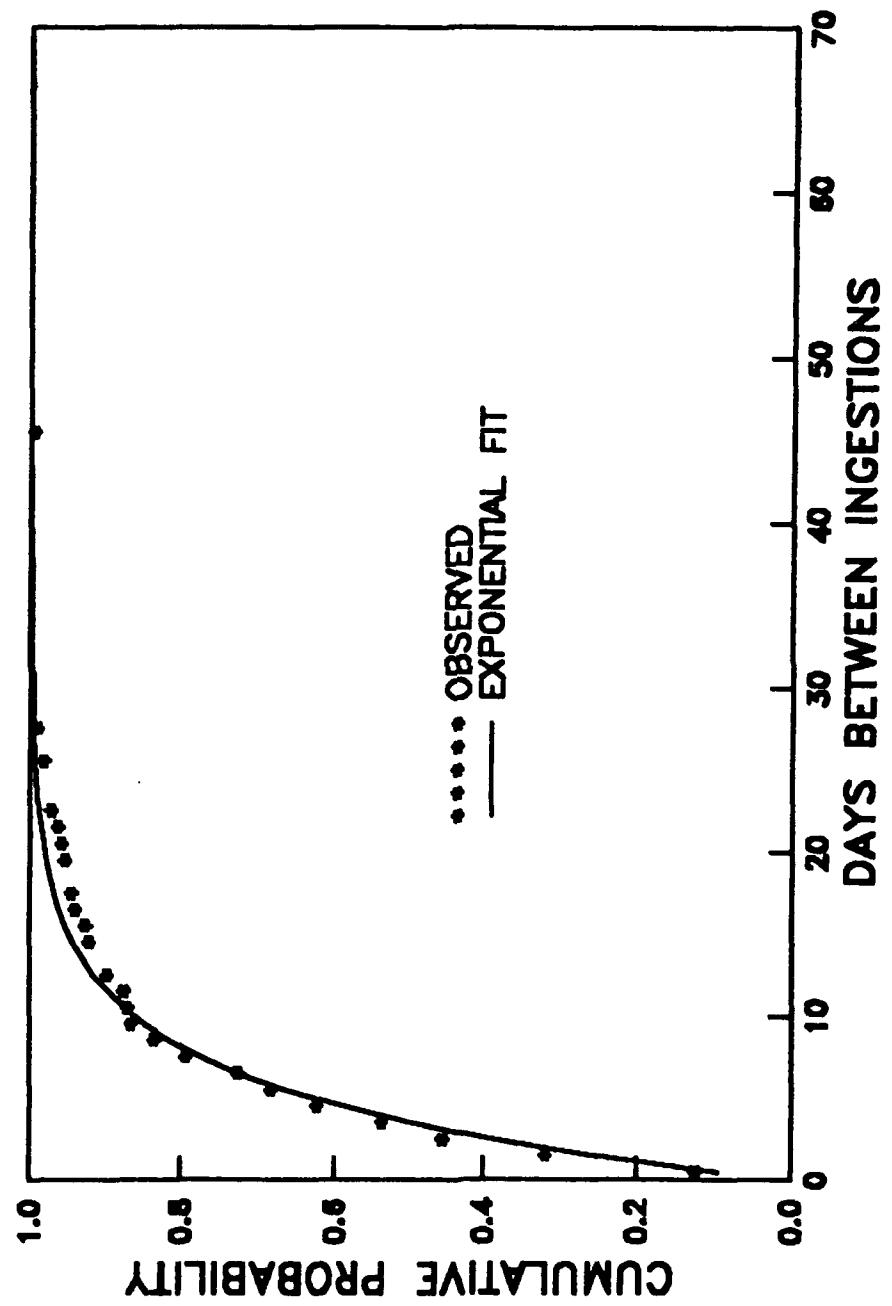


Figure 4.7 Comparison of Observed and Predicted CDFs for Foreign CFM56 Aircraft Ingestion Events.

The visual similarities are verified by the statistical tests which are summarized in Table 4.3. The mean time between ingestion events is given in column one. The sample size given in column two is the count of times between ingestions and is one less than the number of aircraft ingestion events. The critical value for a 5 percent significance level (D^*) is in column three, and the test statistic (D) is in column four. The assumption that the times between ingestion events come from an exponential distribution cannot be rejected at the 5 percent level in any of the six groups. The use of a Poisson process to model bird ingestions is appropriate based on these test results.

4.4 INLET AREA EFFECT ON INGESTION RATES.

One property of the Poisson process model described in Section 4.2 is that ingestion rates should be proportional to the inlet area of the engine. The size effect can be investigated in the B737 bird ingestion data by comparing the number of ingestion events of the JT8D with the number of ingestion events of the CFM56. According to Equation 4.4 the total number of ingestion events during the reporting period for a given engine has a Poisson distribution with a mean that is proportional to the number of aircraft operations in the reporting period and to the inlet area of the engine. The number of JT8D ingestion events out of the total number of ingestion events will have a binomial distribution if the Poisson process model is valid.

The proportion of total ingestion events that occurred in JT8D engines for a particular geographic region should be:

$$P = \frac{OJ \cdot AJ}{OJ \cdot AJ + OC \cdot AC}, \quad (4.5)$$

where OJ and OC are the numbers of regional aircraft operations for, and AJ and AC are the inlet areas of, the JT8D and CFM56 engines, respectively. The relevant values for Equation 4.5 can be obtained from Table 4.1A giving an expected proportion of JT8D ingestion events of $P = 0.50$ for United States ingestion events and $P = 0.62$ for foreign ingestion events. The observed proportion of JT8D events is 0.47 for the United States and 0.72 for foreign ingestion events. The test statistic to compare the observed proportion to the predicted is the standard Z statistic for the binomial distribution given by:

$$Z = \frac{\hat{P} - P}{\sqrt{(P * (1-P) / N)}}, \quad (4.6)$$

where \hat{P} is the observed proportion of JT8D engines and N is the total number of aircraft ingestion events for the geographic region.

The Z statistic defined in Equation 4.6 is used to test the null hypothesis that there is no difference between the two types of engines in ingestion rates for each region after adjusting for area. The test statistics for the two geographic regions are computed by substituting the observed proportions for \hat{P} and the expected proportions for P in Equation 4.6. The computed Z values are -0.89 for United States ingestion events and 6.035 for foreign ingestion events. The tests show no difference in ingestion rates between engines after adjusting for area for the United States events; however, the test for foreign events is significant at the 5 percent level of significance

TABLE 4.3

RESULTS OF THE EXPONENTIAL GOF TESTS
TO VERIFY THE POISSON PROCESS

JT8D ENGINE

<u>GEOGRAPHIC AREA</u>	<u>MEAN</u>	<u>SAMPLE SIZE</u>	<u>D*</u>	<u>D</u>
United States	8.15	131	.093	.042
Contiguous US	9.28	115	.099	.055
Foreign	1.91	571	.044	.033

CFM56 ENGINE

<u>GEOGRAPHIC AREA</u>	<u>MEAN</u>	<u>SAMPLE SIZE</u>	<u>D*</u>	<u>D</u>
United States	7.45	146	.088	.076
Contiguous US	7.55	144	.088	.068
Foreign	5.04	217	.072	.063

indicating that the area adjustment does not fully explain the observed difference in engine ingestion rates for foreign events.

A second school of thought suggests that the relationship between engine size and ingestion rate is described better as a linear function of inlet diameter than as a linear function of inlet area. A similar Z test can be computed by substituting inlet diameter for inlet area in Equation 4.5. The expected proportions of JT8D ingestion events after an adjustment for inlet diameter are $P = 0.59$ and $P = 0.70$ for the United States and foreign events, respectively. The test statistics are $Z = -3.94$ and $Z = 1.42$ for the United States and foreign events, respectively. The null hypothesis is that there is no difference in ingestion rates after adjusting for inlet diameter, and the conclusion of the test is that there is no detectable difference at the 5 percent level of significance for the foreign events but is different for United States events.

There appears to be an engine size effect on ingestion rates; however, it is not clear whether it is best described by inlet area or diameter. The inlet area provides a good fit for the United States ingestions but not the foreign rates while inlet diameter provides a good fit for foreign rates but not for United States rates. The discrepancy could be due to differences in collection rates between the geographic regions; however, there are no data that could be used to determine whether collection rates varied geographically.

SECTION 5

AIRPORT BIRD INGESTION EXPERIENCE

The objective of the statistics of this section is to identify the frequency and location of bird ingestion events at airports worldwide. An aircraft ingestion event is the simultaneous ingestion of one or more birds by one or more engines of an aircraft. All of the bird ingestion data were provided by the engine manufacturer. Airport ingestion rates are expressed in terms of aircraft ingestion events per 10K airport operations.

The OAG tapes indicate that there are 1,143 airports worldwide for which 17,821,706 B737 airport operations were scheduled during the reporting period. Appendix A lists the airport code, airport location, and both the number of scheduled airport operations and number of aircraft ingestion events at these airports for each of the 3 years in the data collection period. Bird ingestion events were reported at only 296 of these airports. The OAG tapes show that there were 12,182,974 scheduled airport operations at these 296 airports over the 3-year period. There were also bird ingestion events reported by unscheduled B737 flights at 27 additional airports. These 27 airports are included in Appendix A but there are no OAG operations counts for them.

A complete summary of the airports having reported aircraft ingestion events is presented in Table 5.1 as a frequency count of worldwide bird ingestion events by phase of flight. The majority of aircraft ingestion events occur during takeoff or landing. This table suggests that the threat of bird ingestion is posed primarily from birds which live near the airport and/or whose migratory path crosses over or near the airport property.

Figure 5.1 is a bar chart showing reported aircraft ingestion events at domestic airports during the reporting period. There are 84 domestic airports at which bird ingestion events have been reported. The largest number of aircraft ingestion events reported in the United States during the 3-year period was 10 at Dallas, Love (DAL) followed by 9 at Houston (HOU). Of the 284 aircraft ingestion events reported in the United States, 91 events occurred at an unknown location and they are assigned to the airport code XUS on the bar chart.

Figure 5.2 is a bar chart showing reported aircraft ingestion events at foreign airports during the reporting period. There are 239 foreign airports at which bird ingestions have been reported. The largest number of aircraft ingestion events reported abroad during the period is 16 at Frankfort, Germany (FRA) followed by 14 at Amsterdam, Netherlands (AMS). Of the 790 aircraft ingestion events reported outside of the United States, 262 events occurred at an unknown location and they are assigned to the airport code XFO on the bar chart.

Table 5.2 lists all airports worldwide which experienced three or more aircraft ingestion events during the reporting period. The airports are listed in descending order of airport operations. The table includes the number of ingestion events, the number of scheduled OAG airport operations, and the rate of aircraft ingestion events per 10,000 airport operations.

TABLE 5.1
FREQUENCY COUNT OF AIRCRAFT INGESTION EVENTS
BY AIRPORT AND PHASE OF FLIGHT.

AIRPORT	AIRPORT DEFINITION	TAXI	TAKEOFF	CLIMB	CRUISE	APPROACH	LANDING	UNKNOWN	TOTAL
001	BLAGNAC, FRANCE (LFBO)	1		1					1
ABQ	ALBUQUERQUE, NM, USA		1						1
ACA	ACAPULCO, MEXICO		1						1
ADD	ADDIS ABABA, ETHIOPIA		1						1
ADL	ADELAIDE, SA, AUSTRALIA		1						1
ADQ	KODIAK, AK, USA								1
AEP	BUENOS AIRES - NEWBERY, ARGENTINA								1
AGR	AGRA, INDIA								1
AJA	AJACCIO, CORSICA, FRANCE		1						2
AJU	ARACAJU, BRAZIL								1
AKL	AUCKLAND, NEW ZEALAND		3						3
ALB	ALBANY, NY, USA		1	1					2
ALC	ALICANTE, SPAIN			1					1
ALG	ALGIERS, ALGERIA								1
AMO	AHMEDABAD, INDIA								1
AMS	AMSTERDAM, NETHERLANDS		6	1					7
AOR	ALOR SETAR, MALAYSIA		8	1					9
ARD	ALOR, INDONESIA		1						1
ASP	ALICE SPRINGS, N.T., AUSTRALIA			1					1
ATH	ATHENS, GREECE			1					1
ATL	ATLANTA, GA, USA			1					1
AUS	AUSTIN, TX, USA			2	1				3
BAH	BAHRAM, BAHRAIN			1					1
BB1	BHUBANESWAR, INDIA								1
BDQ	VADODARA, INDIA								1
BEG	BELGRADE, YUGOSLAVIA								1
BFN	BLOEMFONTEIN, SOUTH AFRICA			5	2				7
BFS	BELFAST, N. IRELAND			1					2
BHI	BAHIA BLANCA, ARGENTINA			1	2				3
BHM	BIRMINGHAM, AL, USA			1					4
BHO	BHOPAL, INDIA					1			1
BHX	BIRMINGHAM, ENGLAND (UK)			2	2	2			6
BHZ	BELO HORIZONTE, BRAZIL			1					1
BJL	BANJUL, GAMBIA			1					1
BJR	BAHAR DAR, ETHIOPIA			1					1
BLR	BANGALORE, INDIA			2					2
BNA	NASHVILLE, TN, USA							1	1
BNE	BRISBANE, QLD, AUSTRALIA								1
BOH	BOURNEMOUTH, ENGLAND, UK					1			1
BOM	BOMBAY, INDIA			2					2
BOS	BOSTON, MA, USA								1
BRE	BREMEN, FED REP OF GERMANY							1	1
BRS	BRISTOL, ENGLAND (UK)								1
BRU	BRUSSELS, BELGIUM					2			2
BUD	BUDAPEST, HUNGARY					4			4
BUE	BUENOS AIRES, ARGENTINA					1			1
BWI	BALTIMORE, MD, USA					1			1
CAG	CAGLIARI, ITALY								1
CAS	CASABLANCA, MOROCCO								1
CBR	CANBERRA, A.C.T., AUSTRALIA								1
CCU	CAICUTA, INDIA								1
CDG	PARIS DE GAULLE, FRANCE								2
CGN	COLOGNE BONN, FRC								1
CGR	CAMPО GRANDE, BRAZIL								3
CHC	CHRISTCHURCH, NEW ZEALAND								5

TABLE 5.1 (Continued)
 FREQUENCY COUNT OF AIRCRAFT INGESTION EVENTS
 BY AIRPORT AND PHASE OF FLIGHT.

AIRPORT	AIRPORT DEFINITION	TAXI	TAKEOFF	CLIMB	CRUISE	APPROACH	LANDING	UNKNOWN	TOTAL
CID	CEDAR RAPIDS/IOWA CITY, IA, USA	1	2						1
CJB	COIMBATORE, INDIA	2	1						1
CJU	CHEJU, REP OF KOREA	1							1
CLE	CLEVELAND, OH, USA	3	3						3
CLT	CHARLOTTE, NC, USA	1	1						1
CMB	COLONBO, SRI LANKA	1	1						1
CMG	CORUMBA, MATO GROSSO, BRAZIL	1	1						1
CNS	CAIRNS, QLD, AUSTRALIA	1	1						1
COX	COCHIN, INDIA	2							2
COR	CORDOBA, ARGENTINA	1	1						1
COS	COLORADO SPRINGS, CO, USA	1	2						1
CPH	COPENHAGEN, DENMARK	2	3						5
CPT	CAPE TOWN, SOUTH AFRICA	3							3
CRP	CORPUS CHRISTI, TX, USA	1							1
CRW	CHARLESTON, WV, USA	1							1
CTC	CATAMARCA, ARGENTINA								
CTU	CHENGDU, P.R. CHINA	1	1	1					1
CMB	CURITIBA, PARANA, BRAZIL		1						1
CWL	CARDIFF, WALES, UK		1						1
DAB	DAYTONA BEACH, FL, USA		2						2
DAL	LOVE DALLS/FT. WORTH, TX, USA		5	1					6
DAY	DAYTON, OH, USA		2	2					4
DCA	NATIONAL, WASHINGTON, DC, USA		2						2
DEL	DELHI, INDIA		2						2
DEN	STAPLETON INT'L, DENVER, CO, USA		2	1					3
DET	DETROIT CITY, MI, USA								
DEU	SOMEWHERE OVER GERMANY								
DFW	DALLAS/FT. WORTH, TX, USA								
DLH	DULUTH, MN, USA								
DTW	WAYNE CO, DETROIT, MI, USA								
DUB	DUBLIN, REPUBLIC OF IRELAND								
DUD	DUNEDIN, NEW ZEALAND								
DUR	DURBAN, SOUTH AFRICA								
DUS	DUESSELDORF, FRG								
EAM	NE-IRAN, SAUDI ARABIA								
EDI	EDINBURGH, SCOTLAND								
ELS	EAST LONDON, SOUTH AFRICA								
EMA	EAST MIDLANDS, ENGLAND								
EWK	NEWARK, NEW YORK, NY, USA								
EZE	BUENOS AIRES-EZEIZA APRT, ARGENTINA								
FAO	FARO, PORTUGAL								
FAT	FRESNO, CA, USA								
FCO	DA VINCI, ROME, ITALY								
FLL	FT LAUDERDALE, FL, USA								
FMA	FORMOSA, ARGENTINA								
FNC	FUNCHAL - MADEIRA, PORTUGAL								
FNT	FLINT, MI, USA								
FRA	FRANKFURT, FRG								
GAJ	YAMAGATA, HONSHU, JAPAN		1						1
GAU	GAGHATI, INDIA								
GHB	GOVERNORS HARBOUR, BERMUDAS								
GHU	QUALEGUAICHU, ARGENTINA								
GIG	RIO DE JANEIRO INT'L, BRAZIL								
GOA	GENOA, ITALY								
GOI	GOA, INDIA								

TABLE 5.1 (Continued)

FREQUENCY COUNT OF AIRCRAFT INGESTION EVENTS
BY AIRPORT AND PHASE OF FLIGHT.

AIRPORT	AIRPORT DEFINITION	TAXI	TAKEOFF	CLIMB	CRUISE	APPROACH	LANDING	UNKNOWN	TOTAL
GOT	GOTHENBURG, SWEDEN	1	1				1	1	2
GRZ	GRAZ, AUSTRIA								2
GSP	GREENVILLE/SPARTANBURG, SC, USA	1	1						2
GVA	GENEVA, SWITZERLAND				1				1
GWL	GVALIOR, INDIA					1			1
HAC	HACHIJŌ, JIMA ISLAND, JAPAN						1	1	2
HAJ	HANOVER, FED REP OF GERMANY								1
HAM	HAMBURG, FRG								1
HND	TOKYO-HANEDA, JAPAN		6	1	1				8
HNM	HANA, MAUI, HI, USA				1				1
HOU	HOUSTON, TX, USA				5	1	3		9
HRL	HARLINGEN, TX, USA						1	1	2
HYD	HYDERABAD, INDIA				4		1	2	7
IAD	DULLES INT'L, WASHINGTON, DC, USA						1	2	3
IAH	HOUSTON INTERCONT, TX, USA				1				1
IBZ	IBIZA, SPAIN								1
INU	NAURU, REP OF NAURU				1		1		2
ISA	MOUNT ISA, QLD, AUSTRALIA								1
ISG	ISHIGAKI, JAPAN								5
ISP	LONG ISLAND MACARTHUR, NY, USA				1				1
ITO	HILO HAWAII, HI, USA								3
IVC	INVERCARGILL, NEW ZEALAND				1				1
IXB	BAGDOGA, INDIA								1
IXC	CHANDIGAR, INDIA								1
IXE	MANGALORE, INDIA				1		2		3
IXJ	JAMMU, INDIA					1			1
IXR	RANCHI, INDIA								1
IXU	AURANGABAD, INDIA								1
IXV	ALONG, INDIA								1
JAI	JAIPUR, INDIA					1			1
JAX	JACKSONVILLE, FL, USA					1			1
JDH	JOHNPUR, INDIA								1
JNB	JOHANNESBURG, SOUTH AFRICA								3
JRH	JORMA, INDIA						1		1
KCH	KUCHING, SARAWAK, MALAYSIA						1		1
KEF	REYKJAVÍK-KEFLAVÍK, ICELAND								1
KGS	KOS, GREECE					1			1
KHH	KAOHSIUNG, TAIWAN								1
KHI	KARACHI, PAKISTAN								1
KIM	KIMBERLEY, SOUTH AFRICA								2
KMG	KUNMING, P.R. CHINA								1
KOA	KONA, HI, USA					1			1
KOJ	KAGOSHIMA, JAPAN								1
KRT	KHARTOUM, SUDAN								1
KST	KOSTI, SUDAN								1
KTM	KATHMANDU, NEPAL								1
KUL	KUALA LUMPUR, MALAYSIA								1
LAS	LAS VEGAS, NV, USA								4
LAX	LOS ANGELES, CA, USA								1
LCA	LARNACA, CYPRUS								1
LDE	LOURDES/TARBES, FRANCE								3
LEX	LEXINGTON, KY, USA								1
LGA	NEW YORK LA GUARDIA, NY, USA								1
LGG	LIEGE, BELGIUM								2
LGW	LONDON-GATWICK, ENGLAND								1

TABLE 5.1 (Continued)

FREQUENCY COUNT OF AIRCRAFT INGESTION EVENTS
BY AIRPORT AND PHASE OF FLIGHT.

AIRPORT	AIRPORT DEFINITION	TAXI	TAKEOFF	CLIMB	CRUISE	APPROACH	LANDING	UNKNOWN	TOTAL
LHE	LAHORE, PAKISTAN							1	3
LHR	LONDON, HEATHROW, ENGLAND, (UK)		1				2	2	5
LIH	LIHUE, KAUAI, HI, USA		7				1		8
LIN	MILAN LINATE, ITALY		2					2	3
LIT	LITTLE ROCK, AK, USA		2	1					3
LJU	LJUBLJANA, YUGOSLAVIA		2						2
LKO	LUCKNOW, INDIA		1						1
LLW	LILONGWE, MALAWI	2							2
LNZ	LONZ, AUSTRIA	1							1
LOS	LAGOS, NIGERIA	1		1				1	3
LPA	GRAN CANARIA, CANARY ISLANDS		1						1
LST	LAUNCESTON, TASMANIA, AUSTRALIA		3	1					4
LTN	LONDON-LUTON INT'L, ENGLAND		3	1					4
LXR	LUXOR, ARAB REP OF EGYPT		1	1					2
LXS	LEMMOS, GREECE		1	1					2
MAA	MADRAS, INDIA		2						2
MAD	MADRID, SPAIN		1						1
MAF	MIDLAND ODESSA, TX, USA		2						2
MAH	MANON, MENORCA, SPAIN		1						1
MAN	MANCHESTER, ENGLAND (UK)		3						3
MCO	ORLANDO-INT'L, FL, USA								
MDP	MINDIPTANA, INDONESIA								
MDQ	MAR DEL PLATA, ARGENTINA		2						2
MDT	HARRISBURG-OLMSTEAD ST, PA, USA		1						1
MDW	CHICAGO-MIDWAY, IL, USA		4						4
MED	MEDINA, SAUDI ARABIA		1						1
MEL	MELBOURNE, VICTORIA, AUSTRALIA		2						2
MFR	MEDFOR, OR, USA		1						1
MGA	MANAGUA, NICARAGUA		1						1
MIA	MIAMI, FL, USA		1						1
MIL	MILAN, ITALY		1						1
MIA	MALTA, MEDITERRANEAN SEA		1						1
MMY	MIYAKO JIMA, JAPAN		1						1
MSO	MISSOULA, MT, USA		1						1
MSP	MINNEAPOLIS-ST PAUL, MN, USA		1						1
MSY	NEW ORLEANS, LA, USA		2						2
MUC	MUNICH, FRG		3	1					4
MXP	MILAN-MALPENSA, ITALY		6						6
MYR	MYRTLE BEACH, SC, USA		1						1
NCE	NICE, FRANCE		1						1
NCL	NEWCASTLE, ENGLAND								
NGO	NAGOYA, JAPAN								
NUE	NUREMBERG, FRG								
OAK	OAKLAND, SAN FRANCISCO, CA, USA		2						2
OGG	KAHULUI, MAUI, HI, USA		1						1
OIT	OITA, JAPAN		2						2
OKC	OKLAHOMA CITY, OK, USA		1						1
OPO	OPORTO, PORTUGAL		1						1
ORD	CHICAGO-O'HARE, IL, USA		4						4
ORF	NORFOLK-VA. BEACH, VA, USA		2						2
ORY	PARIS - ORLY AIRPT, FRANCE		4						4
PAT	PATNA, INDIA		2						2
PB	PEDRO BAY, AS, USA		1						1
POX	PORTLAND, OR, USA		2						2
PEK	BEIJING, P. R. CHINA		1						1

TABLE 5.1 (Continued)

FREQUENCY COUNT OF AIRCRAFT INGESTION EVENTS
BY AIRPORT AND PHASE OF FLIGHT.

AIRPORT	AIRPORT DEFINITION	TAXI	TAKEOFF	CLIMB	CRUISE	APPROACH	LANDING	UNKNOWN	TOTAL
PEN	PENANG, MALAYSIA			1	1				2
PHL	PHILADELPHIA/WILMINGTON, PA, USA			2		1		2	4
PHX	PHOENIX, AZ, USA							1	1
PIE	TAMPA-ST. PETERSBURG, FL, USA	4		1					4
PLZ	PORT ELIZABETH, SOUTH AFRICA	3							3
PMF	PORTSMOUTH, UK	1							1
PMI	PALMA MALLORCA ISLAND, SPAIN	1							1
PMR	PALMERSTON, NEW ZEALAND	1							1
PNA	PAMPLONA, SPAIN	1							1
PSA	PISA, ITALY	1							1
PTY	PANAMA CITY, PANAMA	1							1
PUL	PULA, YUGOSLAVIA	1							1
PVD	PROVIDENCE, RI, USA	1							1
PVN	PORTO VELHO, BRAZIL	2							2
QTV	TREVISO, ITALY								1
RAP	RAPID CITY, SD, USA	1							1
REC	RECIFE, BRAZIL	1							1
RES	RESISTENCIA, ARGENTINA			1					1
RNO	RENO, NV, USA	1		1					2
ROA	ROANOKE, VA, USA			1					1
ROC	ROCHESTER, NY, USA	1		1					2
RUH	RIYADH, SAUDI ARABIA	1		1					1
SAB	SABA, NETH. ANTILLES								1
SAL	SAN SALVADOR, EL SALVADOR	1		1					1
SAN	SAN DIEGO, CA, USA								1
SAO	SAO PAULO, BRAZIL								1
SAT	SAN ANTONIO, TX, USA	2	1	1					4
SAV	SAVANNAH, GA, USA								1
SCC	PRUDHOE BAY, DEADHORSE, AK, USA								1
SCN	SAARBRUECKEN, FRG					1			1
SDF	LOUISVILLE, KY, USA	1							1
SDJ	SENDAI, JAPAN								1
SPN	SANTA FE, ARGENTINA								1
SFO	SAN FRANCISCO-OAKLAND, CA, USA	3							3
SHI	SHIMODISHIMA, JAPAN								1
SJC	SAN JOSE, CA, USA	2							2
SLA	SALTA, ARGENTINA	1							1
SLC	SALT LAKE CITY, UT, USA								1
SLL	SALALAH, OMAN	1							1
SL2	SAO LUIZ, MARANHAO, BRAZIL	1							1
SMF	SACRAMENTO, CA, USA	1							1
SNA	ORANGE COUNTY, CA, USA	1							1
SRQ	SARASOTA/BRADENTON, FL, USA	2							2
STN	LONDON-STANSTED, ENGLAND, UK								1
STR	STUTTGART, FRG	3							3
STV	SURAT, INDIA	1							1
SVG	STAVANGER, NORWAY								1
SYR	SRINAGAR, INDIA	1							1
SYD	SYDNEY, N.S.W., AUSTRALIA	1							1
SYR	SYRACUSE, NY, USA	1							2
TCI	TENERIFE, CANARY IS.								1
TFS	TENERIFFE-REINASOFIA, CANARY ISLAND	2							1
TGD	TITOGRAD, YUGOSLAVIA								1
TLV	TEL AVIV-YAFO, ISRAEL	1							1
TNG	TANGIER, MOROCCO	2							2

TABLE 5.1 (Concluded)

FREQUENCY COUNT OF AIRCRAFT INGESTION EVENTS
BY AIRPORT AND PHASE OF FLIGHT.

AIRPORT	AIRPORT DEFINITION	TAXI	TAKEOFF	CLIMB	CRUISE	APPROACH	LANDING	UNKNOWN	TOTAL
TPA	TAMPA/ST PETERSBURG, FL, USA		1						1
TRN	TURIN, ITALY		1					3	1
TRV	TRIVANDRUM, INDIA						1	1	2
TSV	TOWNSVILLE, QLD, AUSTRALIA		1				1	1	2
TTJ	TOTTORI, JAPAN								2
TUC	TUCUMAN, ARGENTINA	1	1						2
TUL	TULSA, OK, USA			3					3
TUN	TUNIS, TUNISIA			1					2
TVL	LAKE TAHOE, CA, USA								1
TXL	WEST BERLIN, GERMANY	1							1
UDR	UDAIPUR, INDIA								1
UET	QUETTA, PAKISTAN								1
UTN	UPINGTON, SOUTH AFRICA								1
VCE	VALVERDE, CANARY ISLANDS								1
VDM	VIEDNA, ARGENTINA								1
VIE	VIENNA, AUSTRIA								1
VNC	VENICE, ITALY								1
VNS	VARANASI, INDIA			2					2
WDH	WINDHOEK, NAMIBIA								1
WLG	WELLINGTON, NEW ZEALAND								2
XFO	UNKNOWN FOREIGN AIRPORT								4
XHM	XIAMEN, P. R. CHINA								1
XRY	JEREZ DE LA FRONTERA, SPAIN								1
XUS	UNKNOWN USA AIRPORT								1
YAM	SAULT STE MARIE, ONT., CANADA								1
YAY	HAY RIVER, NT, CANADA								1
YN2	HALIFAX, NS, CANADA								1
YKA	KAMLOOPS, BC, CANADA								1
YLW	KELOWNA, BC, CANADA								1
YNN	FT MCMURRAY, ALTA, CANADA								1
YOU	OTTAWA, ONT., CANADA								1
YOB	QUEBEC, QUE, CANADA								1
YQR	QUEBEC, QUE, CANADA								1
YOT	REGINA, SASK, CANADA								1
TUL	THUNDER BAY, ONT, CANADA								1
YYO	MONTREAL, QUEBEC, CANADA								1
YYR	VAL D'OR, QUE, CANADA								1
YYG	NORMAN WELLS, NT, C. NADA								1
YXJ	VANCOUVER, BC, CANADA								1
YXS	WINNIPEG, MAN, CANADA								1
YYC	EDMONTON-MUNICIPAL, ALBERTA, CANADA								1
YYJ	PRINCE GEORGE, BC, CANADA								1
YYT	CALGARY, ALBERTA, CANADA								1
YYZ	EDMONTON, AB, CANADA								1
YYZ	VICTORIA, BC, CANADA								1
YYZ	ST JOHNS, NFLD, CANADA								1
YYZ	TORONTO, ONTARIO, CANADA								2
YYZ	YELLOWKNIFE, NT, CANADA								1
YYZ	SANDSPIT, BC, CANADA								1
ZRN	ZURICH, SWITZERLAND								2
ZTH	ZAKINTHOS, GREECE								2
-0-	AIRPORT UNKNOWN								2
	AIRPORTS WITH KNOWN INGESTIONS	7	394	64	13	56	184	358	1,076

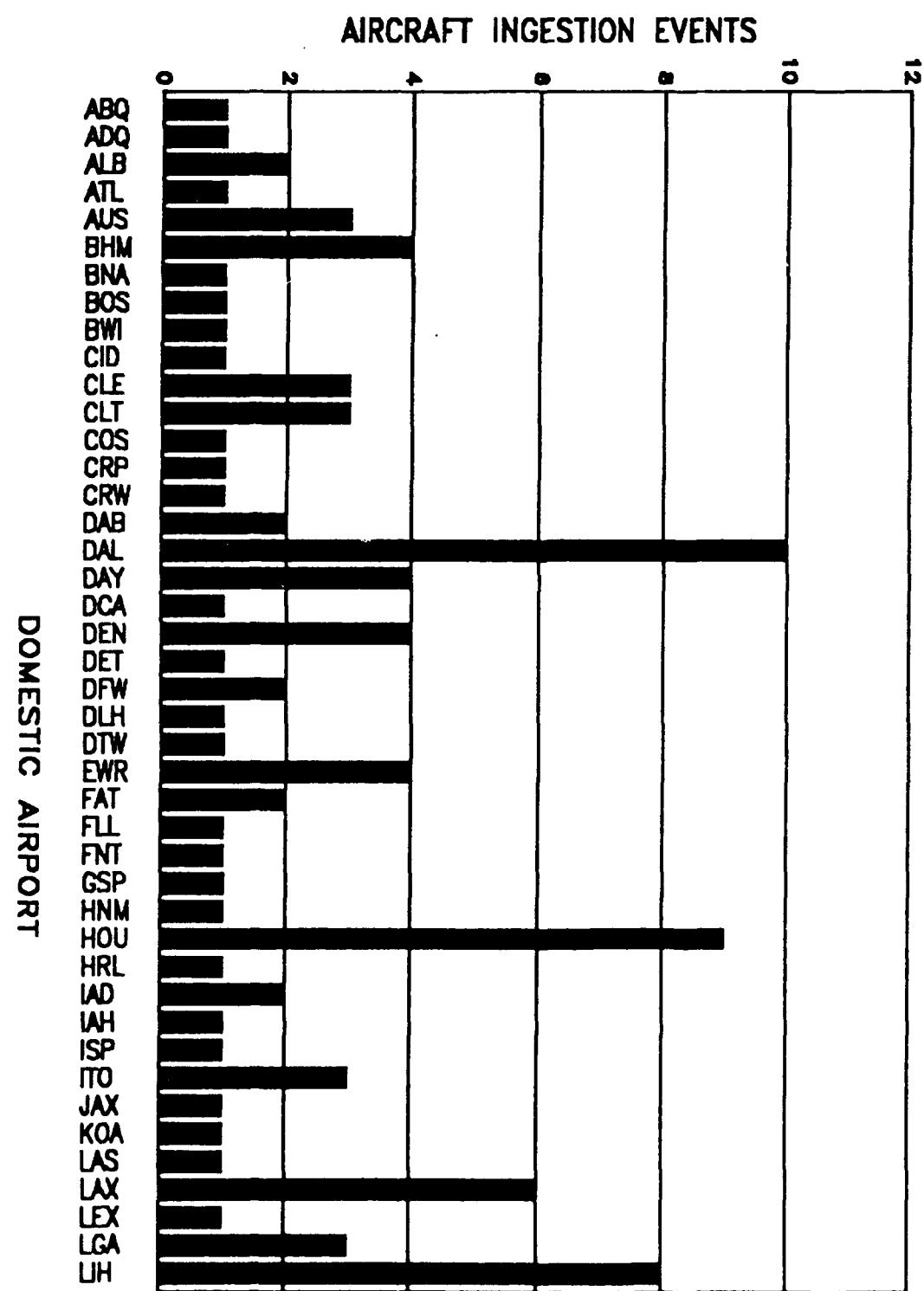


Figure 5.1 Histogram of Aircraft Ingestion Events at Domestic Airports.

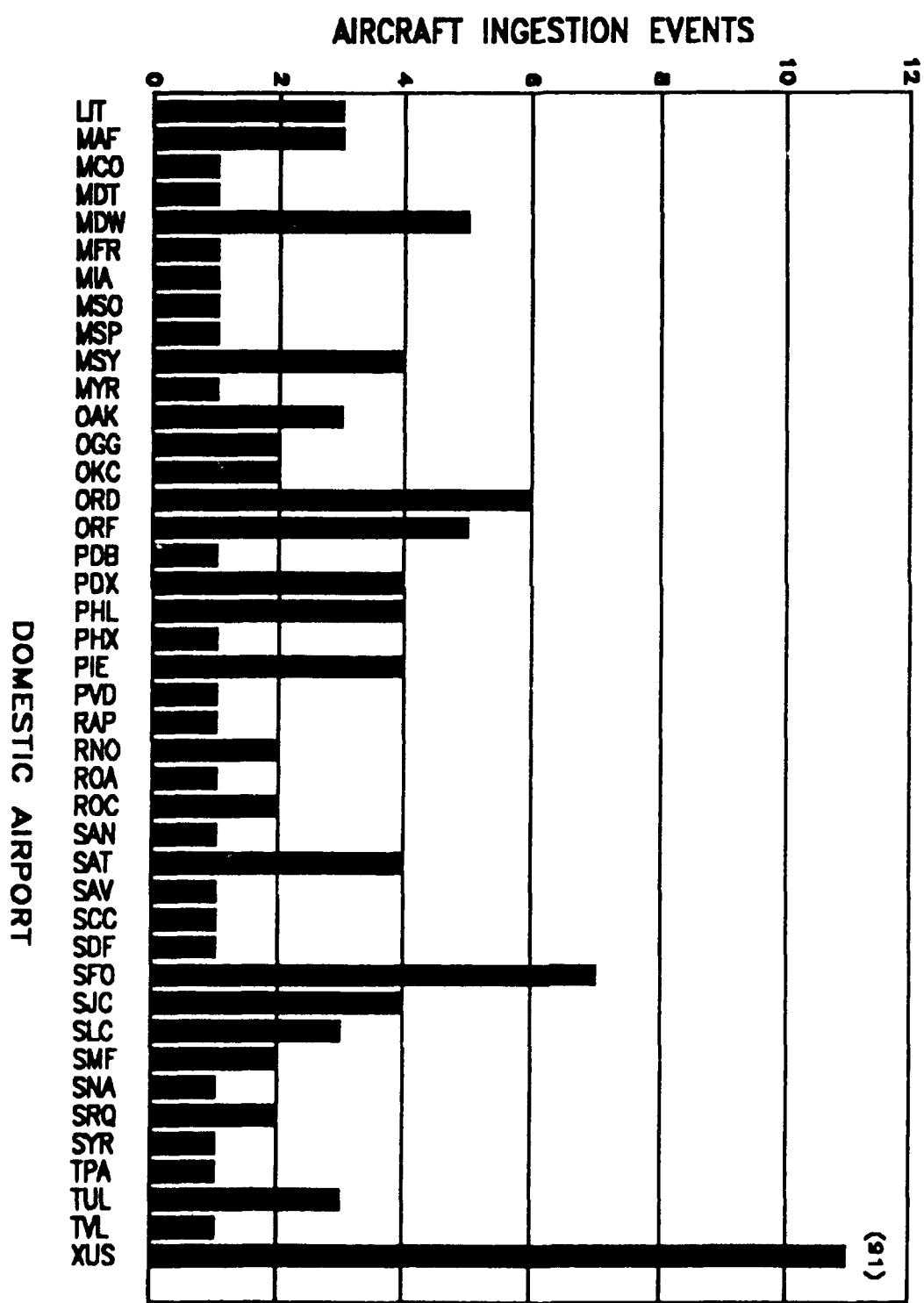


Figure 5.1 Histogram of Aircraft Ingestion Events at Domestic Airports. (Concluded)

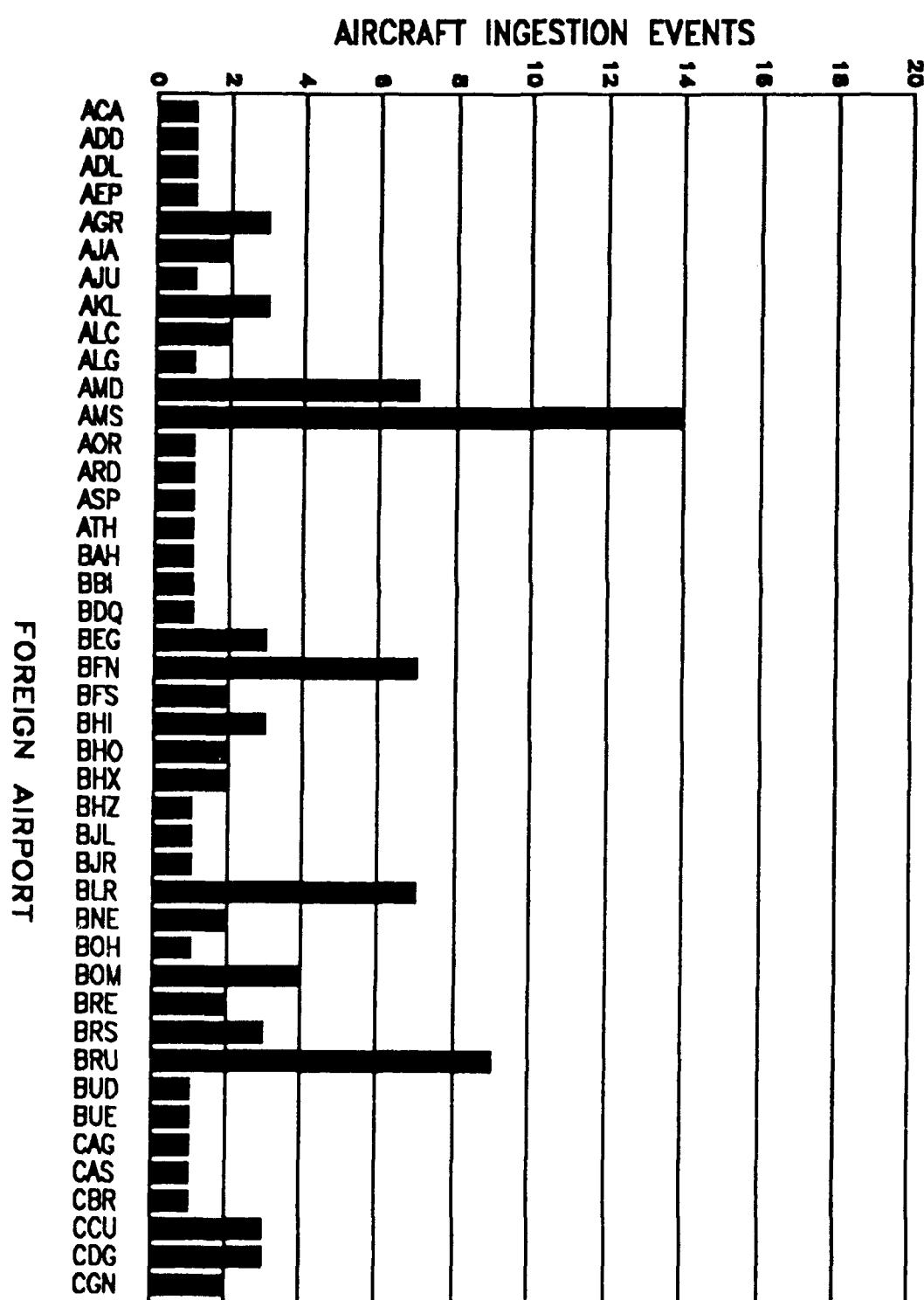


Figure 5.2 Histogram of Aircraft Ingestion Events at Foreign Airports..

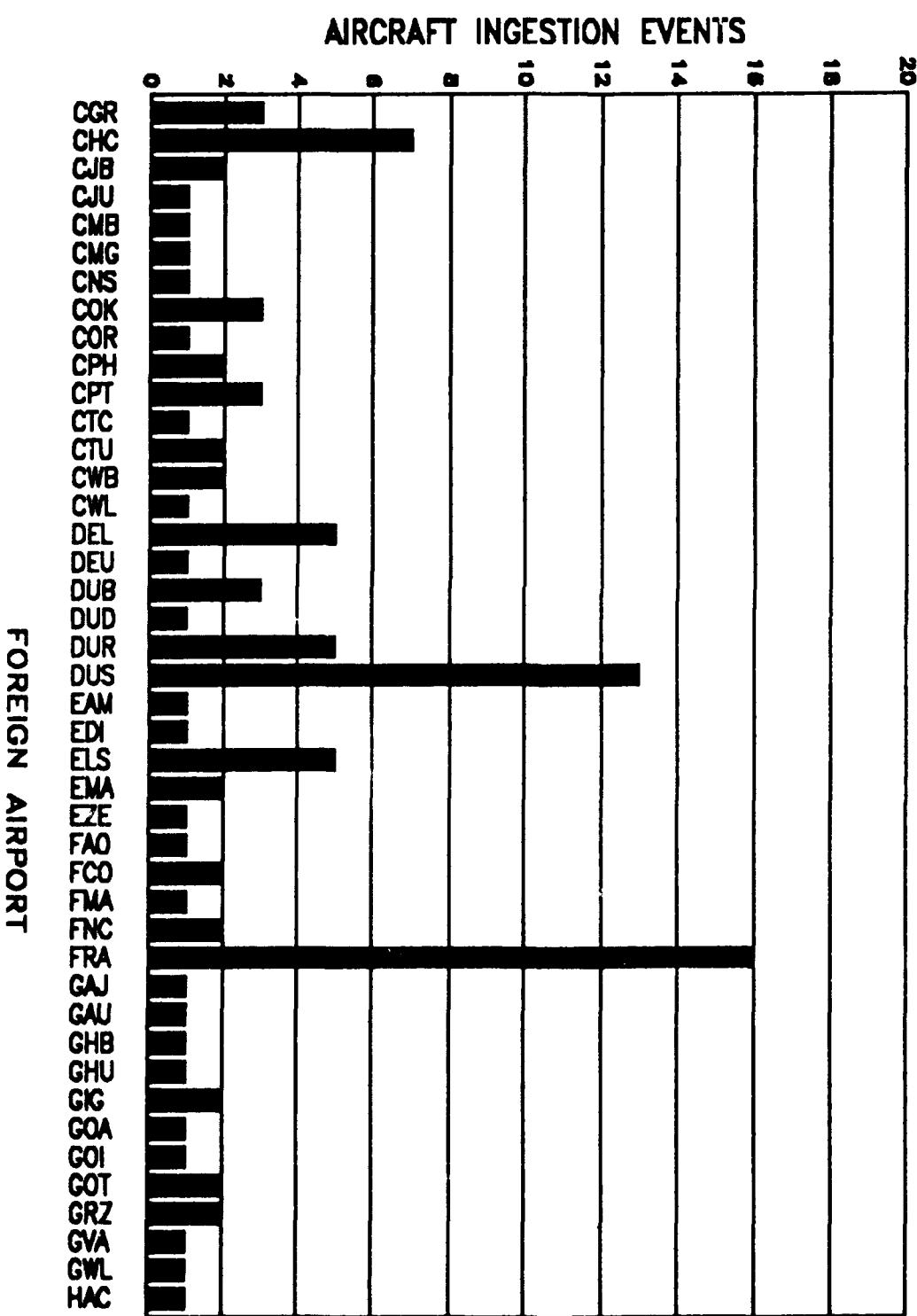


Figure 5.2 Histogram of Aircraft Ingestion Events at Foreign Airports. (Continued)

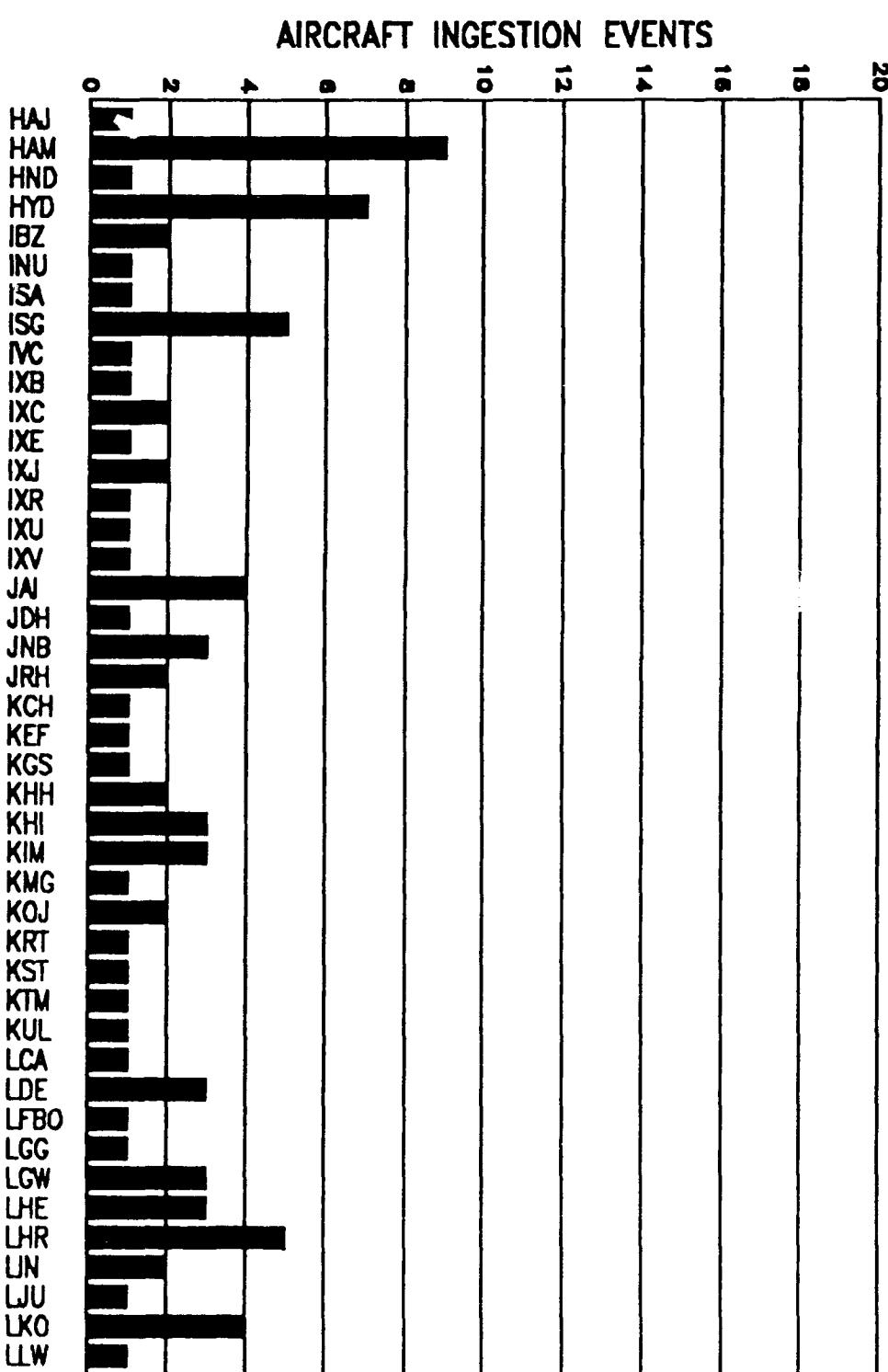


Figure 5.2. Histogram of Aircraft Ingestion Events at Foreign Airports
 (Continued).

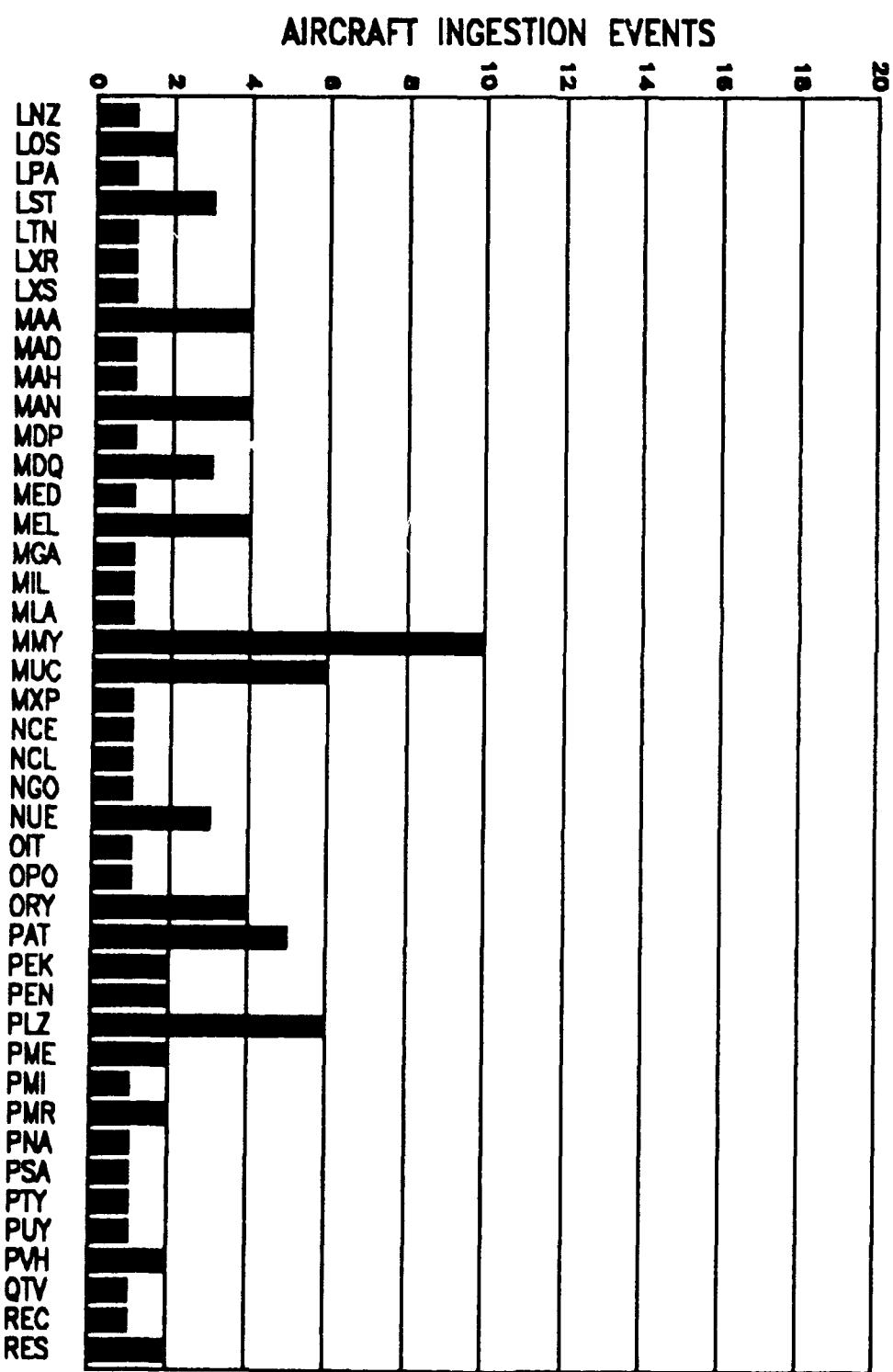


Figure 5.2. Histogram of Aircraft Ingestion Events at Foreign Airports
(Continued).

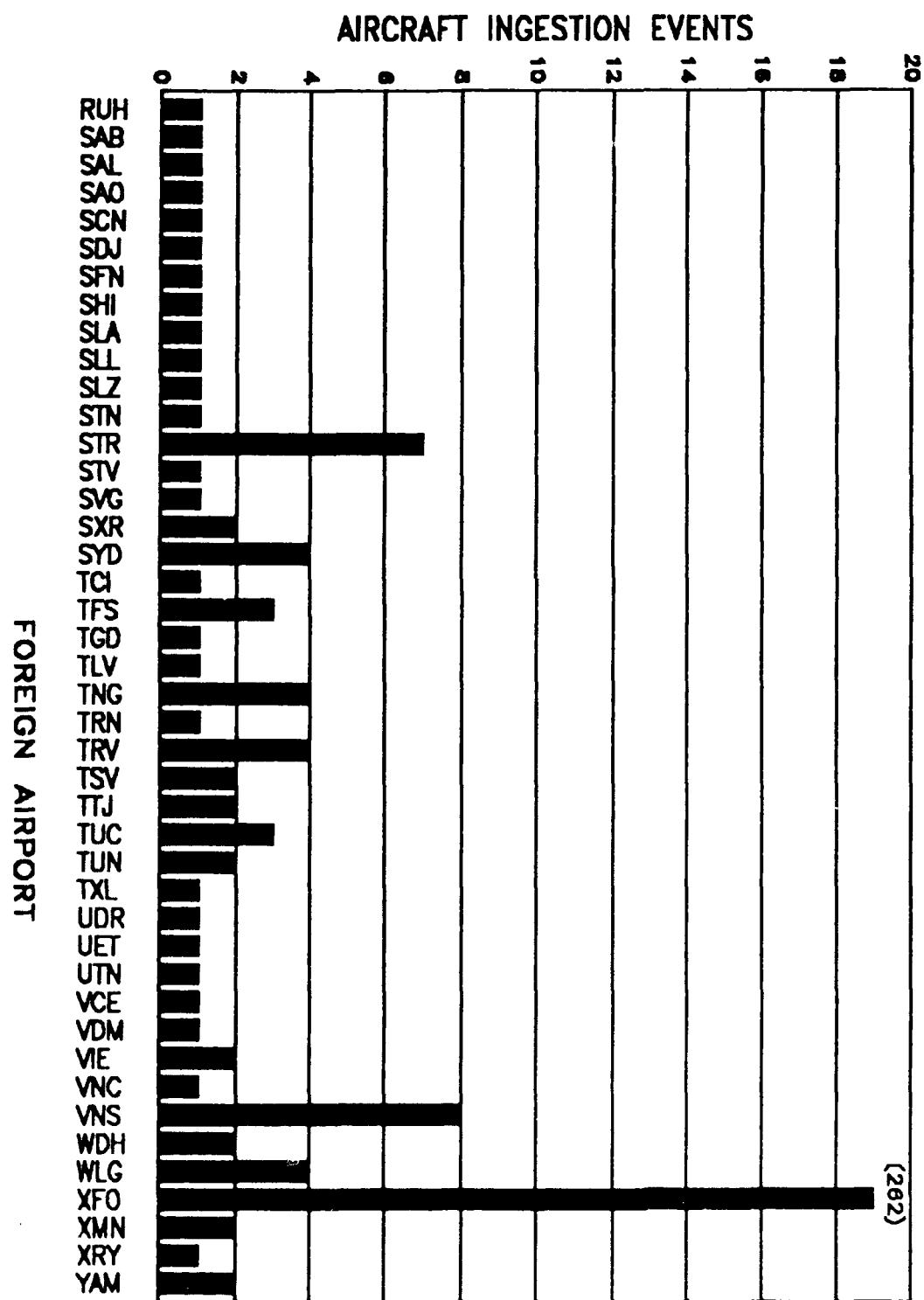


Figure 5.2. Histogram of Aircraft Ingestion Events at Foreign Airports
(Continued).

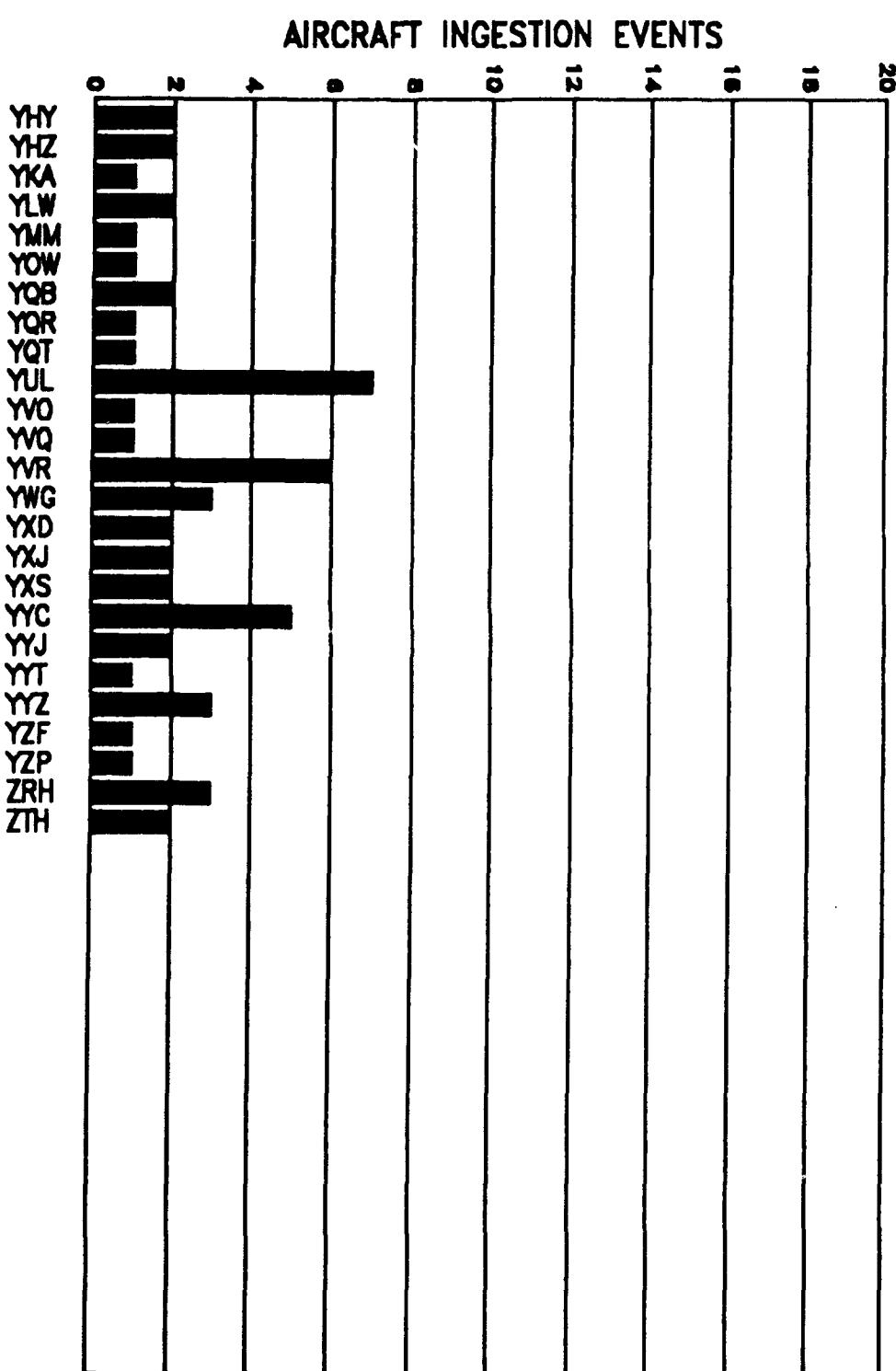


Figure 5.2. Histogram of Aircraft Ingestion Events at Foreign Airports
(Concluded).

TABLE 5.2 AIRPORT BIRD INGESTION RATES
(3 or More Aircraft Ingestion Events)

Airport Code	Scheduled Airport Operations	Aircraft Ingestion Events	Ingestion Rate Events/10K Ops	Airport Location
LAX	355	538	6	LOS ANGELES, CA, USA
DEN	332	616	0.17	STAPLETON INT'L, DENVER, CO, USA
CIT	331	701	0.12	CHARLOTTE NC, USA
SFO	254	777	0.09	SAN FRANCISCO-OAKLAND, CA, USA
ORD	249	201	0.27	CHICAGO-O'HARE IL, USA
EUR	239	871	0.24	NEW YORK, NY, USA
HOU	238	809	0.16	HOUSTON TX, USA
LHR	227	610	0.38	LONDON HEATHROW ENGLAND, (UK)
DAL	221	634	0.21	LOVE DALLES/FT. WORTH TX, USA
SLC	172	698	0.44	SALT LAKE CITY, UT, USA
FRA	136	511	0.14	FRANKFURT FRG
YYZ	128	978	0.93	TORONTO, ONTARIO, CANADA
MDW	128	873	0.22	CHICAGO-MIDWAY IL, USA
DAY	124	730	0.39	DAYTON, OH, USA
MUC	125	778	0.47	MUNICH, FRG
PHL	119	819	0.32	PHILADELPHIA/WILMINGTON, PA, USA
CLE	119	856	0.25	CLEVELAND, OH, USA
SJC	112	876	0.36	SAN JOSE, CA, USA
YVR	109	879	0.55	VANCOUVER BC, CANADA
SAT	101	897	0.00	SAN ANTONIO, TX, USA
LGA	100	8900	0.39	NEW YORK LA GUARDIA, NY, USA
BRU	100	9913	0.30	BRUSSELS BELGIUM
AUS	996	5330	0.89	AUSTIN TX, USA
DUS	996	5380	0.31	DUESSELDORF, FRG
YYC	916	5720	0.52	CALGARY ALBERTA, CANADA
MSY	914	572	0.44	NEW ORLEANS LA, USA
AMS	899	704	0.56	AMSTERDAM NETHERLANDS
CDG	886	983	0.34	PARIS DE GAULLE, FRANCE
TUL	885	2974	0.35	TULSA, OK, USA
HAM	880	971	0.11	HAMBURG, FRG
OAK	777	470	0.39	OAKLAND SAN FRANCISCO, CA, USA
WLG	754	242	0.53	WELLINGTON NEW ZEALAND
DUB	712	650	0.42	DUBLIN REPUBLIC OF IRELAND
SYD	710	211	0.56	SYDNEY N.S.W. AUSTRALIA
AKL	704	344	0.43	AUCKLAND NEW ZEALAND
MEL	696	604	0.77	MELBOURNE VICTORIA AUSTRALIA
CHC	681	167	0.03	CHRISTCHURCH NEW ZEALAND
LGW	671	116	0.45	LONDON-GATWICK ENGLAND
YUL	655	3663	0.7	MONTRÉAL QUÉBEC CANADA
ORF	646	753	0.77	NORFOLK-VA. BEACH, VA, USA
STR	599	973	0.77	STUTTGART, FRG
PDX	559	447	0.72	PORTLAND OR, USA
LHH	542	320	0.47	LIHUE, KAUAI, HI, USA
DEL	500	333	1.00	DELHI, INDIA
BOM	481	159	0.83	BOMBAY INDIA
JNB	455	059	0.62	JOHANNESBURG SOUTH AFRICA
MAF	451	147	0.66	MIDLAND ODESSA, TX, USA
YWG	447	751	0.67	WINNIPEG, MAN., CANADA

TABLE 5.2 (Concluded) AIRPORT BIRD INGESTION RATES
(3 or More Aircraft Ingestion Events)

Airport Code	Scheduled Airport Operations	Aircraft Ingestion Events	Ingestion Rate Events/10K Ops	Airport Location
ZRH	41,321	3	0.73	ZURICH, SWITZERLAND
PLZ	40,727	6	1.47	PORT ELIZABETH, SOUTH AFRICA
BEG	38,517	5	0.78	BELGRADE, YUGOSLAVIA
CCU	33,422	5	0.90	CALCUTTA, INDIA
ELS	31,567	5	1.58	EAST LONDON, SOUTH AFRICA
LIT	31,026	5	0.97	LITTLE ROCK, AK, USA
CPT	30,773	5	0.97	CAPE TOWN, SOUTH AFRICA
ILO	27,787	5	1.08	HILO HAWAII, HI, USA
BHM	26,703	5	1.50	BIRMINGHAM, AL, USA
LHE	25,548	5	1.17	LAHORE, PAKISTAN
ORY	25,127	5	1.59	PARIS - ORLY AIRPT, FRANCE
KHI	25,124	5	1.19	KARACHI, PAKISTAN
DUR	24,288	5	2.06	DURBAN, SOUTH AFRICA
MAA	24,266	5	1.65	MADRAS, INDIA
MAN	24,179	5	1.65	MANCHESTER, ENGLAND (UK)
CCR	23,424	5	2.28	CAMPOMARQUA, BRAZIL
BLR	23,250	5	3.01	BANGALORE, INDIA
ISG	20,767	5	2.41	ISHIGAKI, JAPAN
AMD	17,076	5	4.10	AHMEDABAD, INDIA
LST	16,128	5	1.86	LAUNCESTON, TASMANIA, AUSTRALIA
COK	14,483	5	3.01	COCHIN, INDIA
BNF	14,158	5	2.07	BLOEMFONTEIN, SOUTH AFRICA
PAT	13,223	5	4.94	PATNA, INDIA
LKO	12,896	5	3.78	LUCKNOW, INDIA
KIM	12,859	5	3.10	KIMBERLEY, SOUTH AFRICA
JAI	12,680	5	2.33	JAIPUR, INDIA
MMY	12,276	5	3.15	MIYAKO JIMA, JAPAN
NUE	11,527	5	2.60	NUREMBERG, FRG
MDO	8,442	5	3.55	MAR DEL PLATA, ARGENTINA
VNS	8,302	8	9.64	VARANASI, INDIA
TRV	7,796	5	5.13	TRIVANDRUM, INDIA
TUC	7,106	5	4.22	TUCUMAN, ARGENTINA
BHU	6,974	5	4.30	BAHIA BLANCA, ARGENTINA
TNG	6,639	5	6.03	TANGIER, MOROCCO
HYD	6,582	5	10.64	HYDERABAD, INDIA
AGR	5,670	5	15.29	AGRA, INDIA
TFS	2,617	5	11.46	TENERIFFE-REINASOFIA, CANARY ISLAND
PIE	645	5	{*}	TAMPA-ST. PETERSBURG FL, USA
BRS	18	3	{*}	BRISTOL, ENGLAND (UK)
LDE		3	{*}	LOURDES/TARBES, FRANCE
	6,710,177 (**)	416 (**)	0.62 (**)	

* High proportion of unscheduled operations prevents calculation of meaningful ingestion rate
** Does not include airports PIE, BRS and LDE

Unscheduled B737 operations are not reflected in the operations counts, whereas ingestion events occurring during either scheduled or unscheduled operations are included in the event counts. Therefore unscheduled B737 operations may account for the apparently higher ingestion rates.

The rates of bird ingestion events per aircraft operation summarized previously in Table 4.1A are twice the rates of bird ingestion events per airport operation. The number of reported foreign bird ingestion events exceeds the number of reported domestic ingestion events by a factor of 2.8; however, the number of foreign airport operations is slightly less than the number of domestic airport operations. The rate of reported bird ingestions per airport operation is 3.3 times higher at foreign airports than at domestic airports. This implies that either (1) there are far less birds in the environment of domestic airports, possibly due to environmental control programs, or (2) foreign airline operators are much more conscientious and cooperative in reporting bird ingestions.

SECTION 6

ENGINE DAMAGE DESCRIPTION

The type of damage incurred by well-defined engine bird ingestion events is useful in refining bird certification test criteria that could lead to improved engine design. In general, three parameters are used to describe engine damage and failure. The first is the type of damage incurred, the second is whether or not the engine failed, and the third is a description of the crew action taken during the engine ingestion event. The first part of this section provides descriptions of the types of damage incurred during the study, the relationships between engine damage and bird weight, engine damage and phase of flight, engine damage and aircraft airspeed, engine damage and multiple engine and multiple bird involvement, and the types of crew actions implemented as a result of the bird ingestion. The second part describes the statistical analysis of the relationship between bird weight and the likelihood of damage occurring in an engine ingestion event. The third part of this section provides estimates of the probabilities of a crew action or an engine shutdown. The fourth part describes the engine failures that were due to bird ingestions.

6.1 ENGINE DAMAGE AND CREW ACTION DESCRIPTIONS.

The types of damage that were identified in the data base were grouped into 14 categories which are defined in Table 6.1. Within the year data collection period all 14 of the categories occurred. Tabulations of the occurrences of combinations of damage categories are presented in Table 6.2. The triangular top portion of the table provides tallies of co-occurrences for all pairs of damage categories. The number in the top portion represents the number of engine ingestion events in which both the row damage and the column damage occurred. The events in which more than two types of damage occurred were also included in the tallies of the top portion of Table 6.2. There were 41 events in which three types of damage occurred, 98 events in which two types of damage occurred, and 307 events with a single type of damage.

There are insufficient data in the top portion of Table 6.2 to make any strong statements about correlations between types of damage. There is some indication that bent and dented fan blades accompany core damage and broken and shingled fan blades and that leading edge fan blade damage accompanies fan blade shingling; however, these trends cannot be strongly substantiated because of the small amount of data. The observed trends could provide the starting point for further investigations into the damage mechanisms of bird ingestions.

The bottom half of Table 6.2 provides tallies of the number of engine ingestion events in which each damage category was the only type of damage and the total number of events that involved each of the damage categories. Fewer than three bent and dented blades, shingled blades, and broken blades seem more likely to occur by themselves than other types of damage. When more than three blades are bent or dented there is a much higher chance that some other type of damage will also occur. As with the trends identified in the top portion of Table 6.2, there is insufficient evidence to strongly substantiate these trends.

TABLE 6.1 DEFINITION OF ENGINE DAMAGE CATEGORIES

<u>DAMAGE CATEGORY</u>	<u>SEVERITY LEVEL</u>	<u>DAMAGE DEFINITION</u>
TRVSFRAC	Severe	Transverse fracture - fan blade broken chordwise (across) and piece liberated (includes secondary hard object damage).
CORE	Severe	Bent/broken compressor blades/vanes, blade/vane clash, blocked/disrupted airflow in low, intermediate, and high pressure compressors.
FLANGE	Severe	Flange separations.
TURBINE	Severe	Turbine damage.
BE/DE>3	Moderate	More than three fan blades bent or dented.
TORN>3	Moderate	More than three torn fan blades.
BROKEN	Moderate	Broken fan blades, leading edge and/or tip pieces missing, other blades also dented.
SPINNER	Moderate	Dented, broken, or cracked spinner (includes spinner cap).
RELEASED	Moderate	Released (walked) fan blades (blade retention mechanism broken).
TORN<3	Mild	Three or fewer torn fan blades.
SHINGLED	Mild	Shingled (twisted) fan blades.
NACELLE	Mild	Dents and/or punctures to the engine enclosure (includes cowl).
LEAD_EDG	Mild	Leading edge distortion/curl.
BEN/DEN	Mild	One to three fan blades bent or dented.

TABLE 6.2

TYPES OF DAMAGE CAUSED BY BIRD INGESTIONS

TRANSFRAC	CORE	CORE	FLANGE	FLANGE	TURBINE	TURBINE	BE/DE>3	BE/DE>3	TORN>3	TORN>3	SPINNER	SPINNER	RELEASED	RELEASED	TORN<3	TORN<3	SHINGLED	SHINGLED	NACELLE	NACELLE	LEAD EDG	LEAD EDG	BEN/DEM	BEN/DEM	LEAD EDG	LEAD EDG	BEN/DEM
ONLY DAMAGE	7	9	0	1	37	0	30	1	0	1	0	1	0	0	1	0	1	0	1	11	6	157	7	64	149	31	98
TOTAL	29	44	2	3	79	2	70	1	1	1	1	1	1	1	1	1	1	1	1	1	1	157	7	64	149	31	98

Tables 6.3 and 6.4 describe the relationship between the weight of the ingested bird and the resulting engine damage. Table 6.3 shows the number of both multiple and single bird engine ingestion events as well as the total number of events with and without reported damage in each specified bird weight range where the bird was positively identified by an ornithologist. Engine damage summaries are shown in Tables 6.4A for all engine ingestion events, 6.4B for single bird events, and 6.4C for multiple bird events. These tables were made by tallying the damage codes from the events shown in Table 6.3 in each specified bird weight range.

Since many of the engine ingestion events have multiple damage categories, the total number of damage categories does not equal the number of engine ingestion events. Tables 6.4A, 6.4B and 6.4C also show the damage sustained by those engines that were considered to have failed due to the bird ingestion. (See section 6.4 for more information on engine failure.)

The amount of data available is insufficient to draw any correlations between the weight of the ingested bird and the type of damage that occurs. However, Table 6.4A shows that 48 percent of the ingestions (62) in which the bird weighed less than or equal to 24 ounces caused no damage. In comparison only 14 percent of the birds ingested that weighed more than 24 ounces caused no engine damage.

The relationship between engine damage, phase of flight and aircraft airspeed is shown in Tables 6.5 and 6.6. Table 6.5 depicts the relationship between engine damage and phase of flight. Of the 744 known phase of flight engine ingestion events, 64 percent occurred on takeoff and climb and 33 percent occurred during approach and landing. Fifty-two percent of the engine ingestion events that took place during takeoff and climb resulted in engine damage; in comparison, only 29 percent resulted in damage during approach and landing. This suggests a relationship between engine speed (thrust) and bird ingestion engine damage, since engine speed would typically be higher during takeoff and climb than during approach and landing. However, engine speed or power was rarely reported during the study. It should be noted that 35 engine failures occurred during takeoff and climb and only 2 engine failures occurred during approach and landing.

Table 6.6 shows the number of engine ingestion events and the number of damaging engine ingestions known to have occurred below 140 knots airspeed and at or above 140 knots. The table also shows the phase of flight that these damaging engine ingestions occurred in those airspeed ranges. There were 12 percent (48 percent versus 36 percent respectively) more engine ingestions that resulted in engine damage at or above 140 knots airspeed than those that occurred below 140 knots. It is also shown that a significantly greater number of damaging ingestions occurred during takeoff and climb than during approach and landing at both aircraft airspeed ranges.

Multiple engine and multiple bird ingestion events present the greatest hazard to aircraft. Table 6.7 shows the number of these events that occurred. Thirty-one aircraft had bird ingestions into both engines during the same event, and eight events resulted in damage to both engines. There were also five events where multiple birds were ingested into both engines; potentially the most hazardous bird ingestion condition an aircraft can encounter.

TABLE 6.3. TALLY OF POSITIVELY IDENTIFIED BIRD SPECIES BY WEIGHT RANGE AND EVENT TYPE

Weight <u>Range (oz.)</u>	Bird Identifications*		
	Total Bird <u>Events</u>	Single Bird <u>Events</u>	Multiple Bird <u>Events</u>
0 < x ≤ 8	70	59	11
8 < x ≤ 16	49	39	10
16 < x ≤ 24	11	9	2
24 < x ≤ 32	10	10	0
32 < x ≤ 40	15	10	5
x > 40	12	11	1
Total	167	138	29

*One counted for each engine ingestion event

TABLE 6.4A. 737 AIRCRAFT ENGINE BIRD INGESTION DAMAGE SUMMARY
(TOTAL BIRD EVENTS)*

<u>Severity</u>	<u>Damage Category</u>	<u>Bird Weight Range (oz.)</u>					
		(0<x≤8)	(8<x≤16)	(16<x≤ 24)	(24<x≤32)	(32<x≤40)	(x>40)
None	None	41	17	4	1	2	2
Damage Unknown	Damage Unknown	1	2	0	1	0	0
Other	Other	0	3	0	1	0	0
Mild							
Lead-Edg	Lead-Edg	2	5	2	1/1	3	0
Shingled	Shingled	10	10/1	1	1	4/2	4/1
Ben/Den	Ben/Den	16/1	9/1	3	1	2	2
Torn<3	Torn<3	0	1	0	0	0	1
Nacelle	Nacelle	1	0	0	2	0	0
Moderate							
Be/De>3	Be/De>3	5	8/3	2/2	0	5/3	4
Torn>3	Torn>3	0	0	0	0	1/1	0
Broken	Broken	4/1	5/2	2/1	4/1	2/1	2
Spinner	Spinner	0	0	0	0	0	0
Released	Released	0	3/2	0	0	2/1	0
Severe							
Trvs Frac	Trvs Frac	3/3	6/6	1/1	2/2	2/2	1/1
Core	Core	2/1	7/6	2/2	1/1	0	3
Flange	Flange	0	1/1	0	1/1	0	0
Turbine	Turbine	1/1	2/2	0	0	0	0

*Number of occurrences/number of occurrences when engine failed

TABLE 6.4B. 737 AIRCRAFT ENGINE BIRD INGESTION DAMAGE SUMMARY
(SINGLE BIRD EVENTS)*

<u>Severity</u>	<u>Damage Category</u>	<u>Bird Weight Range (oz.)</u>					
		(0<x≤8)	(8<x≤16)	(16<x≤ 24)	(24<x≤32)	(32<x≤40)	(x>40)
	None	38	16	3	1	2	2
	Damage Unknown	1	2	0	1	0	0
	Other	0	1	0	1	0	0
Mild							
	Lead-Edg	1	3	1	1/1	3	0
	Shingled	7	7/1	1	1	0	3/1
	Ben/Den	12	8/1	2	1	1	1
	Torn<3	0	1	0	0	0	1
	Nacelle	1	0	0	2	0	0
Moderate							
	Be/De>3	2	3/1	2/2	0	4/2	4
	Torn>3	0	0	0	0	1/1	0
	Broken	3	5/2	2/1	4/1	2/1	1
	Spinner	0	0	0	0	0	0
	Released	0	1/1	0	0	1	0
Severe							
	Trvs Frac	2/2	4/4	1/1	2/2	1/1	1/1
	Core	2/1	3/2	2/2	1/1	0	3
	Flange	0	1/1	0	1/1	0	0
	Turbine	1/1	0	0	0	0	0

*Number of occurrences/number of occurrences when engine failed

TABLE 6.4C. 737 AIRCRAFT ENGINE BIRD INGESTION DAMAGE SUMMARY
(MULTIPLE BIRD EVENTS)*

<u>Severity</u>	<u>Damage Category</u>	<u>Bird Weight Range (oz.)</u>					
		(0<x≤8)	(8<x≤16)	(16<x≤ 24)	(24<x≤32)	(32<x≤40)	(x>40)
None	None	3	1	1	0	0	0
Damage Unknown	Damage Unknown	0	0	0	0	0	0
Other	Other	0	2	0	0	0	0
Mild							
Lead-Edg	Lead-Edg	1	2	1	0	0	0
Shingled	Shingled	3	3	0	0	4/2	1
Ben/Den	Ben/Den	4/1	1	1	0	1	1
Torn<3	Torn<3	0	0	0	0	0	0
Nacelle	Nacelle	0	0	0	0	0	0
Moderate							
Be/De>3	Be/De>3	3	5/2	0	0	1/1	0
Torn>3	Torn>3	0	0	0	0	0	0
Broken	Broken	1/1	0	0	0	0	1
Spinner	Spinner	0	0	0	0	0	0
Released	Released	0	2/1	0	0	1/1	0
Severe							
Trvs Frac	Trvs Frac	1/1	2/2	0	0	1/1	0
Core	Core	0	4/4	0	0	0	0
Flange	Flange	0	0	0	0	0	0
Turbine	Turbine	0	2/2	0	0	0	0

*Number of occurrences/number of occurrences when engine failed

TABLE 6.5. PHASE-OF-FLIGHT (POF) ANALYSIS

	<u>Known POF Aircraft Events/ Engine Ingestions (718/744)</u>	<u>Known POF Damaging Aircraft Events/ Engine Ingestions (319/330)</u>	<u>Known POF Engine Failure Ingestions (37)</u>
Takeoff and Climb	458/476	241/249	35
Approaching and Landing	240/248	68/71	2

TABLE 6.6. AIRCRAFT AIRSPEED ANALYSIS

<u>Aircraft Airspeed</u>	<u>Known Speed Engine Ingestions (339)</u>	<u>Known Speed Engine Ingestions, Takeoff And Climb (219)</u>	<u>Known Speed Engine Ingestions, Landing And Approach (105)</u>
< 140 Knots	217	123	84
≥ 140 Knots	122	96	21
<u>Aircraft Airspeed</u>	<u>Known Speed Damaging Engine Ingestions (138)</u>	<u>Known Speed Damaging Engine Ingestions, Takeoff And Climb (113)</u>	<u>Known Speed Damaging Engine Ingestions, Landing And Approach (25)</u>
< 140 Knots	79	59	20
≥ 140 Knots	59	54	5

TABLE 6.7. MULTIPLE ENGINE AND MULTIPLE BIRD ANALYSIS

	<u>Aircraft Events/ Engine Ingestions</u>	<u>Damaging Engine Ingestions</u>	<u>Engine Failure Ingestions</u>
Multiple Engine	31/62	26/8*	2
Multiple Bird	84/89	52	9
Single Bird	992/1018	442	31

*Aircraft events where more than one engine damaged

Table 6.7 also gives the number of engine ingestion events where more than one bird was ingested into the engine. Of the 89 multiple bird engine ingestions that occurred, 58 percent of the ingestions resulted in some engine damage. In comparison only 43 percent of the engines that ingested a single bird resulted in some engine damage. Ten percent of the multiple bird ingestions resulted in engine failures compared to only three percent of the single bird ingestions.

There were four types of crew action identified in connection with the aircraft ingestion events in the data base. An air turnback was performed in 105 of the events, the takeoff was aborted 99 times, a diversionary maneuver was performed 14 times, and in two events the crew action was listed as "other" without specifying the type of action taken. There was no crew action taken in 463 of the aircraft ingestion events for which a crew action entry was recorded, which was nearly 70 percent of the time. (One airplane crashed on takeoff.) The crew action should correspond to the phase of flight in which the event occurred. No change in the flight is usually required when an ingestion occurs during a landing maneuver. The aborted takeoffs and air turnbacks would most likely occur during takeoff and climb phases since there were practically no ingestions during the cruise phase. However, there was one air turnback as a result of a bird ingestion during the cruise phase.

6.2 PROBABILITY OF DAMAGE.

One of the key questions that inspired the bird ingestion survey is the issue of what weight bird should be considered for certification test criteria. Two of the main issues in deciding what the certification bird size should be are (1) the likelihood of ingesting a bird of the certification size or larger and (2) the likelihood that damage will result from ingesting a bird of a specified weight. The issue of bird weights is discussed in Sections 3 and 7 while the probability of damage is the topic of this section.

The problem of relating bird weight to the probability of damage (POD) is similar to bio-assay experiments which try to predict the probability of a response as a function of dose size. The key elements of similarity are that the probability of success for a dichotomous (pass/fail) trial is related to a continuous stimulus variable. In bird ingestions, the dichotomous trial is whether or not damage occurs and the stimulus variable is the weight of the ingested bird.

Linear logistic analysis is the most commonly used method of analyzing the dosage-response type of data and has been used successfully in relating the probability of transparencies breaking as a function of projectile size in dealing with the problem of propwash blown gravel breaking helicopter windshields [9]. The logistic distribution function is assumed to describe the relationship between the probability of damage and the bird weight in a linear logistic analysis. The logistic distribution function is given by:

$$POD(w) = 1/(1+\exp[-(\pi/\sqrt{3})(w-\mu)/\sigma]) \quad (6.1)$$

where w is the bird weight, μ is the weight with a 50 percent chance of causing damage and σ is a parameter that is related to the steepness of the POD function.

The estimation of the function given in Equation 6.1 has been extensively studied, and the methods have been described in the literature [10,11]. The method of maximum likelihood provides the best estimates for the type of data in the bird ingestion study since there are only a few ingestions at each weight. The software for estimating the parameters of Equation 6.1 has been developed and extensively tested at the University of Dayton Research Institute [12] and verified by researchers at other institutions.

The types of damage were categorized as mild, moderate, or severe by the FAA. Table 6.8 itemizes the types of damage that were included in each of the severity categories. Three distinct analyses were conducted based on the severity ratings. The three analyses estimated the probability of any damage, the probability of at least moderate damage, and the probability of severe damage as a function of bias weight. Figures 6.1, 6.2, and 6.3 show the estimated POD functions along with confidence bounds on the POD functions for the three analyses. Note that the figures are based on the weight of one ingested bird per event, not the total weight of all birds ingested in the case of a multiple bird ingestion event.

Figure 6.1 shows the probability of any damage occurring and includes all three severity levels as positive responses. The probability of any damage occurring rises very steeply reaching 50 percent at about 6.0 ounces and the curve levels off at the 90 percent level at about 70 ounces. The relationship between bird weight and the probability of any damage is very strong and results in the confidence bound being close to the mean trend curve.

The probability of moderate damage does not rise quite so steeply, and a definitive weight cutoff between birds that cause damage and those that do not cause damage cannot be identified. The probability of moderate damage reaches 50 percent at 33 ounces and remains below 80 percent through the weight range collected in this study. The confidence bound shown in Figure 6.2 is further from the mean trend than the confidence bound in Figure 6.1 because the trend in the probability of moderate damage as a function of bird weight is not as strong as the trend in the probability of any damage.

The probability of severe damage and its confidence bound are plotted in Figure 6.3 as functions of bird weight. The probability of severe damage is much lower than the probabilities of any damage or moderate damage. As a result, the curves are much flatter and rise much more slowly than the curves in Figures 6.1 and 6.2. The probability of severe damage remains below 40 percent through the weight range collected in this study.

The probability of damage analysis is clouded by the poor bird identification rates. The estimated POD functions are likely to be biased toward higher POD values since there was a larger proportion of birds identified when engine damage occurred. The extent of the bias cannot be estimated accurately.

6.3 CREW ACTION AND ENGINE SHUTDOWN PROBABILITIES.

Two other factors that relate to the severity of engine damage are whether or not a crew action is required and whether or not an engine was shut down as a result of the ingestion. Table 6.9 lists the conditional probabilities that a crew action is required given the severity of damage that the engine incurs.

TABLE 6.8 DAMAGE SEVERITY DEFINITIONS

<u>SEVERITY LEVEL</u>	<u>DAMAGE DEFINITION</u>
SEVERE DAMAGE	Damage classified as severe. Achieved when reported damage category is TRVSFRAC, CORE, FLANGE, or TURBINE.
MODERATE DAMAGE	Damage classified as moderate. Achieved when reported damage category is BE/DE>3, TORN>3, BROKEN, SPINNER, or RELEASED <u>AND</u> no SEVERE damage has been reported.
MILD DAMAGE	Damage classified as mild. Achieved when reported damage category is LEAD EDG, BEN/DEN, TORN<3, SHINGLED, or NACELLE <u>AND</u> neither SEVERE nor MODERATE damage has been reported.

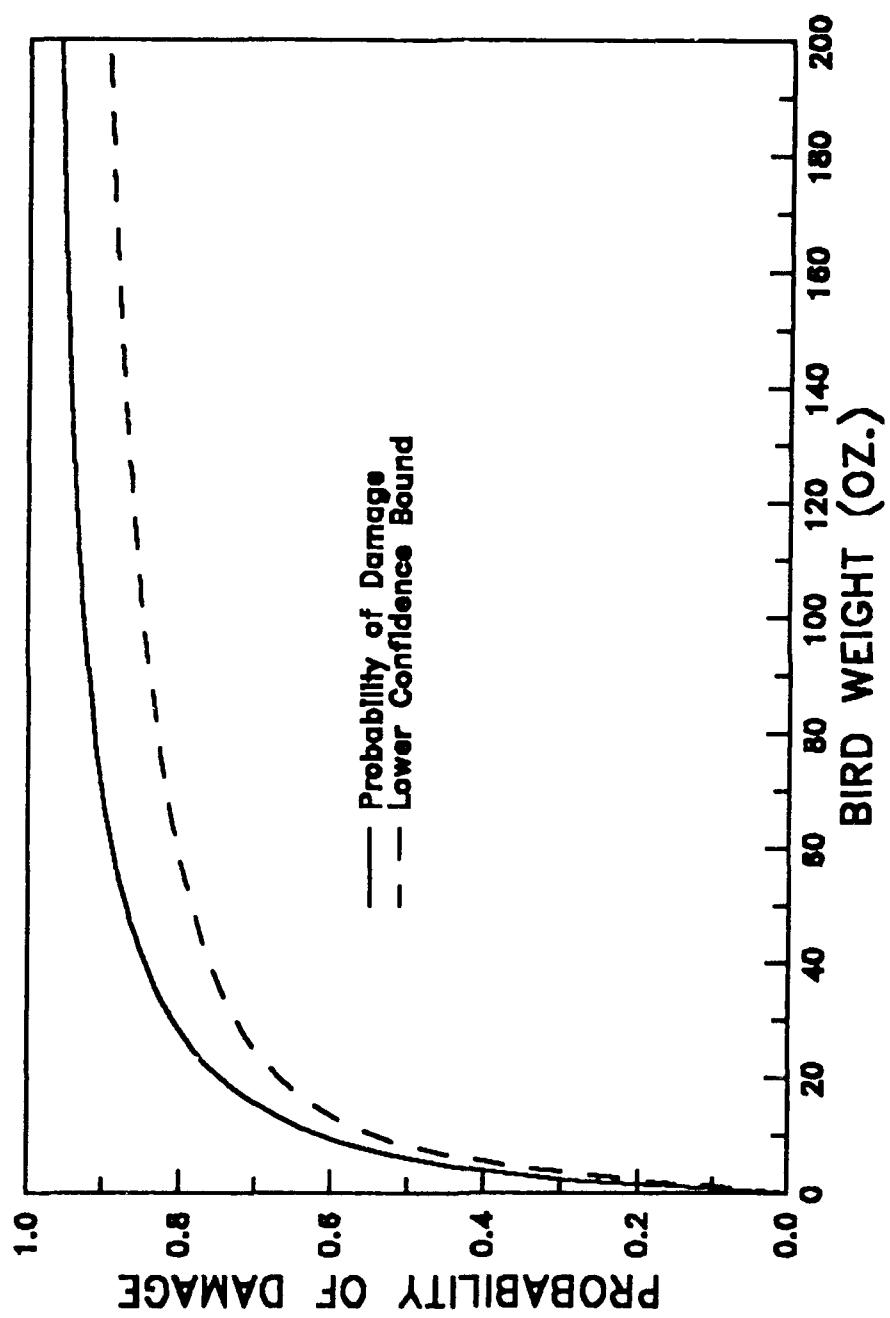


Figure 6.1. Estimated POD Function for any Damage with the 95 Percent Confidence Bound.

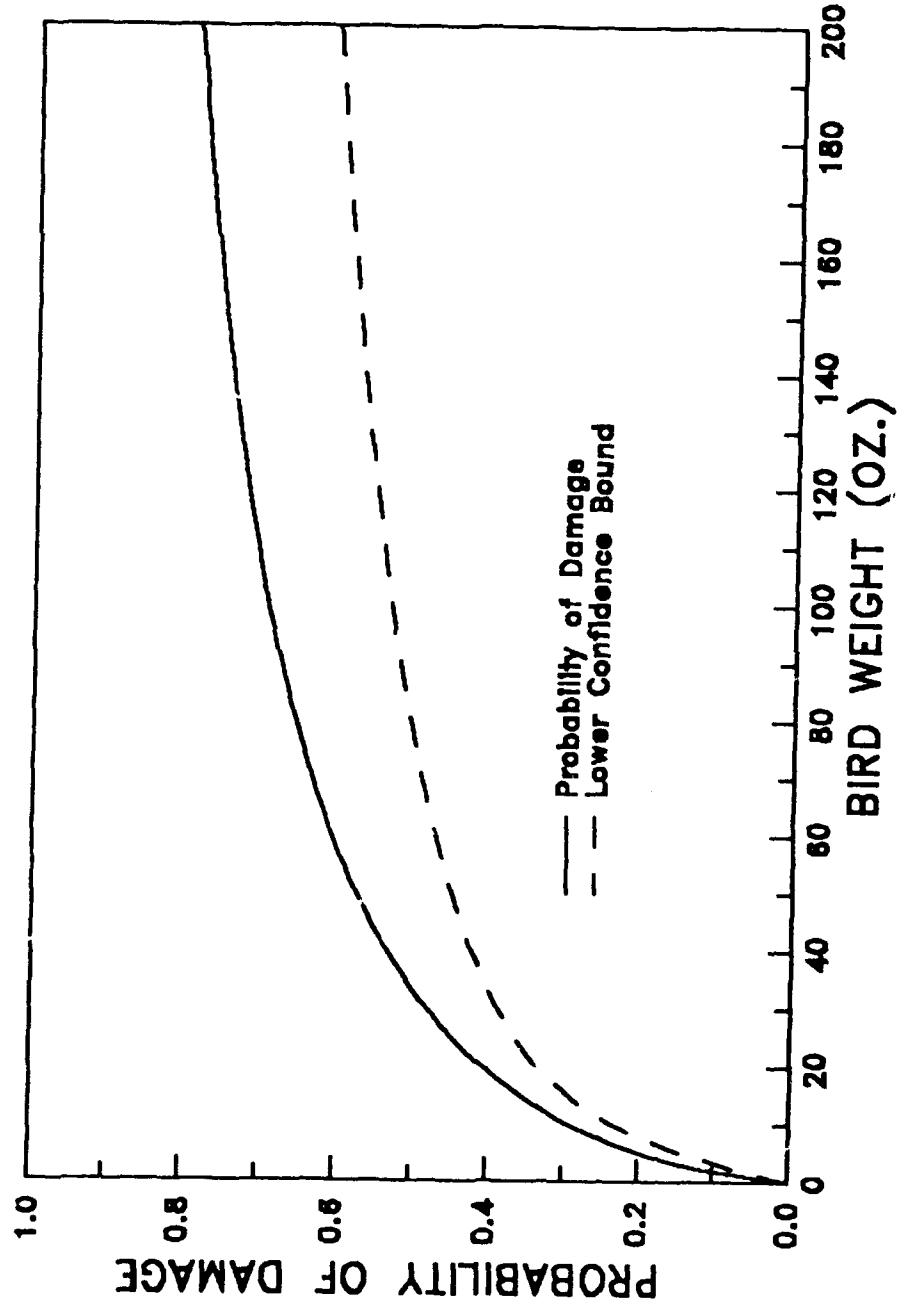


Figure 6.2 Estimated POD Function for Moderate or Worse Damage with the 95 Percent Confidence Bound.

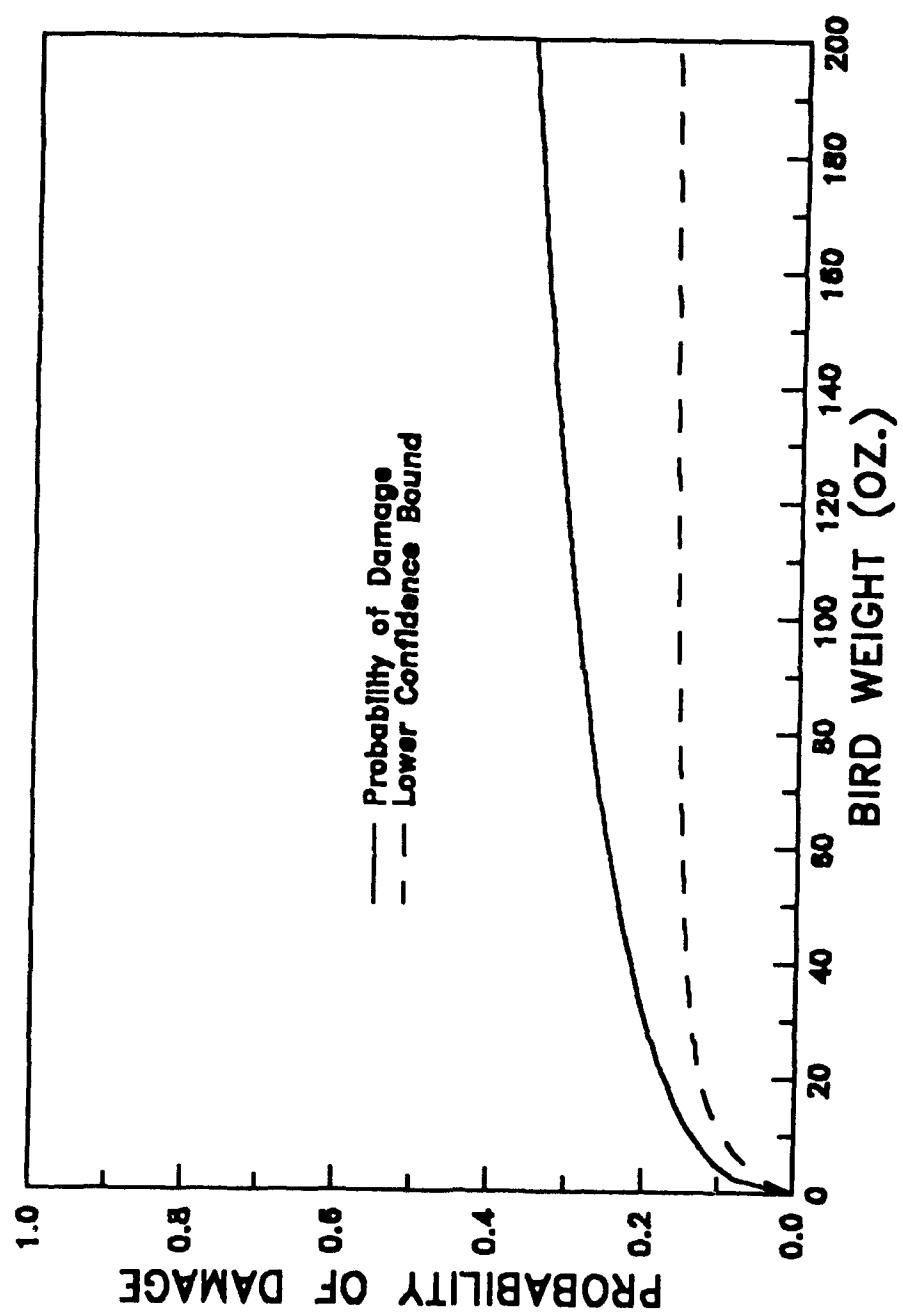


Figure 6.3 Estimated POD Function for Severe Damage with the 95 Percent Confidence Bound.

TABLE 6.9
CONDITIONAL PROBABILITY OF CREW ACTION
GIVEN THE ENGINE DAMAGE SEVERITY

<u>ENGINE DAMAGE SEVERITY</u>	PROBABILITY OF CREW ACTION <u>P(CA)</u>	UPPER CONFIDENCE BOUND
NO DAMAGE	.145	.173
ANY DAMAGE	.283	.326
AT LEAST MODERATE DAMAGE	.400	.488
SEVERE DAMAGE	.571	.755

The probability that a crew action is required increases with the severity of engine damage, as expected. The third column of Table 6.9 contains the upper 95 percent confidence bound on the conditional probabilities given in column two.

The formula for the estimates of the conditional probability of a crew action given the engine damage severity are:

$$\hat{P} = \frac{C}{N_s} \quad (6.2)$$

$$P_{CB} = \hat{P} + 1.645 \sqrt{\frac{\hat{P}(1-\hat{P})}{N_s}} \quad (6.3)$$

In Equations (6.2) and (6.3), P is the estimated conditional probability of a crew action, C is the number of aircraft ingestion events in which a crew action was taken and an engine sustained the given severity level, N_s is the number of aircraft ingestion events in which an engine sustained the given severity level and P_{CB} is the upper confidence bound on the conditional probability. The constant 1.645 is derived from the cumulative normal distribution function to give a 95 percent level of confidence.

An in-flight engine shutdown occurred in 40 of the 1,076 aircraft ingestion events (which corresponds to an estimated probability of an in-flight engine shutdown given that an ingestion has occurred of 0.037 with a 95 percent confidence bound of 0.048). The reason for the shutdown was not known in 19 of the events. An involuntary shutdown occurred seven times. Excessive vibration precipitated the shutdown nine times. The engine was shut down because of incorrect engine pressure ratio three times, incorrect engine parameter readings once, and high exhaust gas temperature twice. Inferences about the causes of in-flight shutdowns cannot be drawn because of the large proportion of shutdowns in which the cause was not identified.

6.4 ENGINE FAILURES.

Engine failures are important areas to consider when analyzing these engine bird ingestion events. For the purpose of this study an engine failure was considered to have occurred when an engine was not able to produce and maintain usable thrust of at least 50 percent. A transverse fan blade fracture and an involuntary engine in-flight shutdown were considered to be engine failures in all cases. Otherwise an engineering judgement was made based on the extent of engine damage, effect on flight, phase of flight, and any other factors that may have been provided in the description of the event or investigation summary.

Table 6.10 provides a summary of some of the important data categories for the engine ingestion events that resulted in an engine failure. The conditional probability of an engine failure given that an ingestion has occurred is 0.038 with a lower 95 percent confidence bound of 0.029. The lower confidence bound was calculated using the Z statistic for proportions. The overall engine failure rate for the 737 aircraft due to bird ingestion was 0.005 failures per ten thousand aircraft operations.

TABLE 6.10. ENGINE FAILURE SUMMARY BY BIRD WEIGHT

<u>Bird (oz.) Weight</u>	<u>Number of Birds</u>	<u>Damage Code</u>	<u>Phase of Flight</u>	<u>Power Loss</u>	<u>In-Flight Shutdown</u>	<u>Crew Action</u>
1.5	1	A,O	Takeoff	Epr Dec	Vibes	ATB
4.0	--	A,I	---	---	---	--
4.0	--	A,I,K	Takeoff	Compressor	No	ATO
7.0	*	A,C,G,I	Takeoff	Compressor	Parameters	ATB
10.1	*	A,I,K	Takeoff	Compressor	Vibes	ATB
11.5	6	A,D,K,O	Takeoff	Compressor	Involuntary	Crashed
11.5	8	A,D,K,O	Takeoff	Compressor	Involuntary	Crashed
12.0	1	A,I,M	Takeoff	Yes	Involuntary	ATB
14.0	1	A,G,I,K	Takeoff	Compressor	---	ATB
14.0	1	A,C,G,I	Takeoff	---	---	ATO
14.0	3	A,I,K,N	Takeoff	Compressor	Egt	ATB
15.0	1	A,D,H	Takeoff	Compressor	Involuntary	ATB
16.0	1	A,I,K,N	Takeoff	Compressor	Involuntary	ATB
22.0	1	A,D,G,K	Takeoff	None	No	ATB
24.0	1	A,D,I,K	Takeoff	Compressor	Voluntary	ATB
28.0	1	A,B,G,K	Takeoff	Spool Down	Involuntary	ATB
28.0	1	A,I,M	Takeoff	---	No	ATO
32.0	1	A,I	Takeoff	Epr Dec	Yes	DIV
38.4	1	A,D,G	Takeoff	---	No	ATO
40.0	1	A,D,F,I	Climb	---	---	ATB
40.0	2	A,D,H	Takeoff	Compressor	Yes	DIV
40.0	*	A,H,I,N	Takeoff	Compressor	Voluntary	ATB
80.0	1	A,H,I	Takeoff	Compressor	Yes	ATB
---	--	A,C,G,I	---	---	---	None

TABLE 6.10. ENGINE FAILURE SUMMARY BY BIRD WEIGHT (Continued)

<u>Bird (oz.)</u>	<u>Number of Birds</u>	<u>Damage Code</u>	<u>Phase of Flight</u>	<u>Power Loss</u>	<u>In-Flight Shutdown</u>	<u>Crew Action</u>
---	---	A,Q	Climb	Spool Down	Involuntary	ATB
---	---	A,G,K	Takeoff	---	Vibes	ATO
---	1	A,I,K,Q	Takeoff	---	No	ATB
---	---	A,I,P	Takeoff	---	No	ATO
---	---	A,C,I,K	Takeoff	---	No	None
---	1	A,F,I	Takeoff	Compressor	Vibes	ATB
---	1	A,B,G,P	Takeoff	None	No	ATO
---	---	A,I,	---	---	---	---
---	*	A,I,K,Q	Takeoff	Compressor	No	ATO
---	1	A,I	Takeoff	Yes	Yes	ATO
---	---	A,I	Takeoff	---	No	---
---	1	A,D,G,K	Approach	Yes	Epr	---
---	1	A,C,G,I	Takeoff	---	---	---
---	---	A,I	---	---	---	---
---	---	A,C,G,I	Landing	None	No	---
---	---	A,I	---	---	---	---
---	2	A,D	Takeoff	Compressor	No	ATO
---	---	A,D,G,K	Takeoff	Compressor	Yes	ATO

*Means more than one bird ingested but the exact count is unknown.

Note: A description of the columns and column contents can be found in Appendix B.

Table 6.10 shows that a voluntary or involuntary in-flight shutdown of the engine occurred in 21 of the 42 engine failures. There was also a power loss associated with 89 percent of the engine failures where there was information reported in the power loss category. The most significant cause of engine failures appears to be transverse fan blade fracture which caused 27 of the 42 engine failures.

Reviewing the bird threat data for these engine failures shows that the species of bird was identified and an estimated weight available in only 23 of the 42 engine failure events. The percentage of identifications is too low to allow statistical inferences about bird weights. The trend for the weights that are available is that the birds ingested in failure events are heavier than the birds ingested in all events. The mean of the weights for the birds that were identified in failure events is 29.8 ounces; which is 11.5 ounces heavier than the overall mean. The higher mean for the failure events should be interpreted as a pointer to a possible trend that should be investigated further since the weight identifications are low.

Thirty-one of the engine failures were caused by the ingestion of a single bird and nine were caused by the ingestion of multiple birds. This is a much higher percentage than the fraction of all ingestion events which involved multiple birds. This suggests that engine failure is more likely in cases of multiple bird ingestion. Also, in 5 of the 23 engine failures where the bird weight was known, the bird or birds weighted more than 2 pounds. However, 13 were caused by birds that weighed less than or equal to 1 pound. Comparing this with the number of engine ingestions where the bird weight was known (Table 6.3), shows that 19 percent and 11 percent of the engine ingestion events resulted in engine failures when the bird weighed more than 2 pounds and less than or equal to 1 pound, respectively.

Almost all of the failure events occurred during takeoff (33) with two failures during the climb, one during the approach, and one during landing. The phase of flight was unknown in five of the failure events. The engine location was split almost in half with 22 failures occurring in the left engine and 20 in the right.

SECTION 7

PROBABILITY ESTIMATES

This section provides a summary of the probabilities of various bird ingestion events. The probability of an event is a measure of the likelihood that the event will occur. The probabilities in this section are calculated on a per operation basis and present similar information to the ingestion rates. The ingestion rates that were presented in Section 4 were calculated on the basis of 10,000 aircraft operations; however, it was shown in Section 4.2 that the per operation ingestion rate is equal to the probability of ingestion for a single operation. This section provides more details on the probabilities of various categories of bird ingestion events.

Table 7.1 provides the estimated probabilities and 95 percent confidence bounds for the whole B737 fleet for various aircraft ingestion events. The overall likelihood of an aircraft ingestion event in a single operation is slightly more than one in ten thousand; and although the odds of having a bird ingestion on any one operation are very small, there are millions of B737 operations each year so that hundreds of ingestions are expected each year. Most ingestions occur during the takeoff and landing phases so that the probabilities for takeoff and climb and the approach and landing phases are relatively large. Dual engine and multiple bird ingestions are relatively rare (which is reflected in the smaller probabilities for these events).

The inlet area effect on aircraft ingestion probabilities is shown in Table 7.2 which separates the probabilities by location and engine. The probabilities for the CFM International CFM56 are always larger than the corresponding probabilities for the Pratt and Whitney JT8D. The larger probabilities for the CFM56 are expected since the inlet area of the CFM56 is nearly twice the inlet area of the JT8D.

The probability of an ingestion that causes moderate or severe engine damage (POI_d) is calculated with respect to engine operations, not aircraft operations. Moderate or severe engine damage occurred in 175 (49 domestic, 125 foreign, 1 unknown) of the 1,107 engine ingestion events reported in the data collection period. The respective worldwide, domestic, and foreign POI_d values for the B737 fleet are 0.98×10^{-5} , 0.50×10^{-5} , and 1.53×10^{-5} . The respective worldwide, domestic, and foreign 95 percent confidence bounds on the POI_d values are 1.11×10^{-5} , 0.64×10^{-5} , and 1.78×10^{-5} .

The effect of bird weight on the probabilities is estimated in Tables 7.3 and 7.4. The entries in Tables 7.3 and 7.4 were calculated by multiplying the overall probability for each location/engine combination by the relative frequency of each bird weight range. The relative frequencies for bird weight ranges were derived from the weights of positively identified birds and are based on the number of events that involved birds in each weight range, not the total number of birds ingested. The validity of this calculation depends on the randomness of bird identifications, as discussed in Section 3. Table 7.3 provides a breakdown of the probability of ingestion (POI) by location and engine while Table 7.4 combines the two engine types. The calculations in Tables 7.3 and 7.4 were made on both an aircraft operation basis (Tables 7.3A and 7.4A) and an engine operation basis (Tables 7.3B and 7.4B). Tables 7.4A

and 7.4B show that the worldwide probability of ingesting one or more birds as a function of bird weight is 0.308×10^{-5} and 0.149×10^{-5} , respectively, at the 44- to 48-ounce weight range for the B737 aircraft fleet. Above this weight range the probability of ingestion decreases.

TABLE 7.1 AIRCRAFT OPERATION INGESTION PROBABILITIES

<u>CONDITION</u>	AIRCRAFT INGESTION EVENTS	PROBABILITY OF INGESTION	* CONFIDENCE BOUND
All Flights	1,071	12.02	12.64
Takeoff & Climb [†]	687	7.71	8.21
Approach & Landing [†]	357	4.01	4.37
Dual Engine / Single Bird Per Engine	20	0.22	0.33
Dual Engine / Multiple Birds	11	0.12	0.20
Multiple Birds / Single Engine	73	0.82	0.99

* Scaled by 10^5

† Contains prorated apportionment of events with unknown phase of flight

TABLE 7.2 AIRCRAFT OPERATION INGESTION PROBABILITIES* BY LOCATION AND ENGINE TYPE
(BASED ON AIRCRAFT INGESTION EVENTS)

	JT8D ENGINE			CFM56 ENGINE		
	UNITED STATES	FOREIGN	WORLDWIDE	UNITED STATES	FOREIGN	WORLDWIDE
Aircraft Operations:	3,250,431	3,145,832	6,396,263	1,578,741	935,849	2,514,590
Condition Under Consideration	Ing Evt	Ingestion Prob'ltty	Ingestion Evt Prob'ltty	Ingestion Evt Prob'ltty	Ingestion Evt Prob'ltty	Ingestion Evt Prob'ltty
All Flights	132	4.06	572	18.18	705†	11.02
Takeoff And Climb Phases	105	3.23	372	11.83	478†	7.47
Approach And Landing Phases	25	0.77	192	6.10	217	3.39
Dual Engine - Single Bird Events	2	0.06	7	0.22	9	0.14
Multiple Birds - Single Engine Events	6	0.18	42	1.34	48	0.75
Multiple Birds - Dual Engine Events	3	0.09	4	0.13	7	0.11

* Ingestion probabilities scaled by 10^5

† Geographic region unknown for 1 takeoff event

†† Engine type unknown for 1 landing event

**PROBABILITY OF INGESTION* AS A FUNCTION OF BIRD WEIGHT BY LOCATION AND ENGINE TYPE
(BASED ON AIRCRAFT OPERATIONS)**

		JT8D ENGINE			CFM56 ENGINE		
		US	FOREIGN	WORLDWIDE	US	FOREIGN	WORLDWIDE
Aircraft Ops:		3,250,431	3,145,832	6,396,263	1,578,741	935,849	2,514,590
Bird Wt Range (Oz.)	Prob. of Ingestion						
(0 < X ≤ 4)	1.740	2.157	2.580	3.853	2.055	3.465	
(4 < X ≤ 8)	0.696	4.623	2.462	0.321	6.166	2.310	
(8 < X ≤ 12)	---	2.157	0.821	0.321	7.536	2.772	
(12 < X ≤ 16)	0.580	1.849	1.290	2.248	2.741	2.541	
(16 < X ≤ 20)	0.116	0.925	0.469	---	2.055	0.693	
(20 < X ≤ 24)	0.116	0.616	0.352	0.321	---	0.231	
(24 < X ≤ 28)	0.116	0.925	0.469	0.321	0.685	0.462	
(28 < X ≤ 32)	---	1.283	0.469	---	---	---	
(32 < X ≤ 36)	---	---	---	0.642	1.370	0.924	
(36 < X ≤ 40)	0.348	1.541	0.938	0.963	---	0.693	
(40 < X ≤ 44)	---	---	---	0.321	---	0.231	
(44 < X ≤ 48)	---	0.925	0.352	0.685	0.231		
(52 < X ≤ 56)	0.232	---	0.235	---	---	---	
(76 < X ≤ 80)	---	0.308	0.117	---	---	---	
(84 < X ≤ 88)	---	0.308	0.117	---	---	---	
(124 < X ≤ 128)	0.116	---	0.117	---	---	---	
(188 < X ≤ 192)	---	0.308	0.117	---	---	---	
(212 < X ≤ 216)	---	0.308	0.117	---	---	---	
All Weights †	4.061	18.183	11.022	9.311	23.294	14.555	

* Probability that either engine will ingest 1 or more birds of a given weight class per aircraft operation. Probabilities have been scaled up by 10^5 .

† Cumulative probability of all weight bands. Also probability of ingestion for engine, location combination.

TABLE 7.3B
PROBABILITY OF INGESTION* AS A FUNCTION OF BIRD WEIGHT BY LOCATION AND ENGINE TYPE
(BASED ON ENGINE OPERATIONS)

Engine Ops:	JT8D ENGINE			CFM56 ENGINE		
	US		FOREIGN	WORLDWIDE		US
	6,500,862	6,291,664	12,792,526	3,157,482	1,871,698	5,029,180
Bird Wt Range (Oz.)	Prob. of Ingestion					
{ 0 < X ≤ 4)	0.854	1.046	1.252	2.188	0.983	1.894
{ 4 < X ≤ 8)	0.342	2.242	1.196	0.156	2.950	1.114
{ 8 < X ≤ 12)	---	1.495	0.569	0.156	4.589	1.671
{ 12 < X ≤ 16)	0.399	0.897	0.740	1.094	1.311	1.225
{ 16 < X ≤ 20)	0.057	0.448	0.228	---	0.983	0.334
{ 20 < X ≤ 24)	0.057	0.299	0.171	0.156	---	0.111
{ 24 < X ≤ 28)	0.057	0.448	0.228	0.156	0.328	0.223
{ 28 < X ≤ 32)	---	0.598	0.228	---	---	---
{ 32 < X ≤ 36)	---	---	---	0.313	0.656	0.446
{ 36 < X ≤ 40)	0.171	0.747	0.455	0.469	---	0.334
{ 40 < X ≤ 44)	---	---	---	0.156	---	0.111
{ 44 < X ≤ 48)	---	0.448	0.171	---	0.328	0.111
{ 52 < X ≤ 56)	0.114	---	0.114	---	---	---
{ 76 < X ≤ 80)	---	0.149	0.057	---	---	---
{ 84 < X ≤ 88)	---	0.149	0.057	---	---	---
(124 < X ≤ 128)	0.057	---	0.057	---	---	---
(188 < X ≤ 192)	---	0.149	0.057	---	---	---
(212 < X ≤ 216)	---	0.149	0.057	---	---	---
All Weights†	2.107	9.266	5.636	4.846	12.129	7.576

* Probability that an engine will ingest 1 or more birds of a given weight class per engine operation. Probabilities have been scaled up by 10^5 .

† Cumulative probability of all weight bands. Also probability of ingestion for engine, location combination.

TABLE 7.4A
 PROBABILITY OF INGESTION* AS A FUNCTION OF BIRD WEIGHT BY LOCATION
 (BASED ON AIRCRAFT OPERATIONS)

BOEING-737 COMMERCIAL FLEET			
	UNITED STATES	FOREIGN	WORLDWIDE
Aircraft Operations:	4,829,172	4,081,681	8,910,853
<hr/>			
Bird Weight Range (Ounces)	<u>Probability Of Ingestion</u>	<u>Probability Of Ingestion</u>	<u>Probability Of Ingestion</u>
(0 < X ≤ 4)	2.481	2.081	2.846
(4 < X ≤ 8)	0.643	4.995	2.384
(8 < X ≤ 12)	0.092	3.746	1.461
(12 < X ≤ 16)	1.103	2.081	1.692
(16 < X ≤ 20)	0.092	1.249	0.538
(20 < X ≤ 24)	0.184	0.416	0.308
(24 < X ≤ 28)	0.184	0.832	0.461
(28 < X ≤ 32)	---	0.832	0.308
(32 < X ≤ 36)	0.184	0.416	0.308
(36 < X ≤ 40)	0.551	1.041	0.846
(40 < X ≤ 44)	0.092	---	0.077
(44 < X ≤ 48)	---	0.832	0.308
(52 < X ≤ 56)	0.184	---	0.154
(76 < X ≤ 80)	---	0.208	0.077
(84 < X ≤ 88)	---	0.208	0.077
(124 < X ≤ 128)	0.092	---	0.077
(188 < X ≤ 192)	---	0.208	0.077
(212 < X ≤ 216)	---	0.208	0.077
All Weights†	5.881	19.355	12.075

* Probability that either engine will ingest 1 or more birds of a given weight class per aircraft operation. Probabilities have been scaled up by 10^6 .

† Cumulative probability of all weight bands in geographic location.

TABLE 7.4B
 PROBABILITY OF INGESTION* AS A FUNCTION OF BIRD WEIGHT BY LOCATION
 (BASED ON ENGINE OPERATIONS)

BOEING-737 COMMERCIAL FLEET			
	UNITED STATES	FOREIGN	WORLDWIDE
Engine Operations:	9,658,344	8,163,362	17,821,706
<hr/>			
Bird Weight Range (Ounces)	<u>Probability Of Ingestion</u>	<u>Probability Of Ingestion</u>	<u>Probability Of Ingestion</u>
(0 < X ≤ 4)	1.303	1.002	1.451
(4 < X ≤ 8)	0.314	2.405	1.153
(8 < X ≤ 12)	0.045	2.405	0.930
(12 < X ≤ 16)	0.629	1.002	0.893
(16 < X ≤ 20)	0.045	0.601	0.260
(20 < X ≤ 24)	0.090	0.200	0.149
(24 < X ≤ 28)	0.090	0.401	0.223
(28 < X ≤ 32)	---	0.401	0.149
(32 < X ≤ 36)	0.090	0.200	0.149
(36 < X ≤ 40)	0.270	0.501	0.409
(40 < X ≤ 44)	0.045	---	0.037
(44 < X ≤ 48)	---	0.401	0.149
(52 < X ≤ 56)	0.090	---	0.074
(76 < X ≤ 80)	---	0.100	0.037
(84 < X ≤ 88)	---	0.100	0.037
(124 < X ≤ 128)	0.045	---	0.037
(188 < X ≤ 192)	---	0.100	0.037
(212 < X ≤ 216)	---	0.100	0.037
All Weights [†]	3.054	9.922	6.212

* Probability that an engine will ingest 1 or more birds of a given weight class per engine operation. Probabilities have been scaled up by 10^5 .

† Cumulative probability of all weight bands in geographic location.

SECTION 8

DATA QUALITY

The interpretations derived from any large set of data are only as good as the data. The use of poor data can lead to invalid and misleading conclusions. The conclusions reached in this report should be interpreted in the context of the sources of the data and the quality of the data. The following paragraphs discuss the sources of data for the 3 years and the quality of the data as measured by the consistency of the data collected in each of the 3 years.

8.1 DATA SOURCES.

The main body of data was collected by the manufacturers of the two engines used on B737 aircraft under separate contracts with the FAA. The FAA also collected data from the FAA Voluntary Bird Strike/Incident Report (FAA Form 5200-7) and from reports received from FAA field inspectors (see FAA Action Notice A8300.39). The method of data collection was a census rather than a survey sample, i.e., the goal was to collect information on every B737 bird ingestion event in the 3-year period. A complete census is nearly impossible to achieve under any circumstances; therefore, estimates involving the total number of ingestions, such as ingestion rates, should be viewed as lower bounds.

One specific factor that may have hindered collecting ingestion data for all B737 bird ingestion events is that the International Civil Aviation Organization (ICAO) collects bird strike data worldwide. Data from ICAO that were not reported by the engine manufacturers are available for part of the 3-year period and have been included in the data listing in Appendix B (identified by the source heading). These data were not used in the analysis.

One method of improving the collection percentage for the B737 bird ingestion data is to include the data collected by the ICAO; however, two problems prevent including the data at this time. The first problem is the collection and reporting cycles of the FAA and the ICAO are not synchronous; therefore, data from the ICAO are not yet available for the full 3-year period. The second problem is that the manner in which bird ingestion reports for individual events were made for the ICAO may differ from the way the engine manufacturers collected bird ingestion event information. The differences could affect interpretations made from the combined data sets.

At some future date, when complete data are available from ICAO and potential conflicts in data collection procedures have been analyzed, all the sources of data could be combined to provide a more complete description of B737 bird ingestions. Since these issues have not been resolved, the descriptions in this report are based only on the data collected by the engine manufacturers and the FAA.

8.2 INTERNAL CONSISTENCY.

The data collected over the third year of the program appear to be consistent with the data collected in the first two years. Most of the tables, graphs, and statistical tests presented in this report for the 3-year period are very

similar to the corresponding data presented in the reports [1,2] for the data collected in the first 2 years. This section provides statistical verification of the similarities and discusses some of the differences.

The first feature for comparing the 3 years is the total number of aircraft ingestion events collected in each year. Section 4 provided evidence that aircraft ingestion events occur according to a Poisson process so that the proportion of events that were recorded in each year should be equal to the proportion of operations conducted in that year.

The same formulas used in Section 4 can be used here except that the area factor is no longer required since comparisons are made between years for the same engine. The formula for the expected proportion of events in year i becomes:

$$P_i = O_i / (O_1 + O_2 + O_3) \quad (8.1)$$

where O_i ($i=1,3$) represents the number of operations for the specific engine and geographic location for year i.

The Chi-squared goodness of fit test is used instead of a Z test since there are more than 2 years. The Chi-squared test statistic provides a measure of the closeness of the observed number of events in each year to the number that would be expected if the collection rates were the same in each year. The expected number of events in year i are given by:

$$E_i = P_i * N \quad (8.2)$$

where N is the total number of events for the 3 years. The test statistic is then given by:

$$\chi^2 = \sum_{i=1}^3 \frac{(X_i - E_i)^2}{E_i}, \quad (8.3)$$

where X_i is the observed number of events in year i.

The data for performing the test are presented in Table 8.1 and Table 8.2. The number of events and number of operations for each year are broken down by engine type and geographic location in Table 8.1. The calculated χ^2 values for the test are given in Table 8.2 for each engine and location combination. The Chi-squared test detects any type of change among the three years and the critical value for a five percent level of significance for a Chi-square with two degrees of freedom is 5.99. The only significant change is in the collection rate for the foreign JT8D data.

The large value of the test statistic for foreign JT8D ingestion rates is caused by a reduction in the amount of data collected in the third year. One possible explanation is that the efforts of ICAO to collect bird ingestion data have hindered the collection of data for the JT8D. ICAO data are not yet available for the entire third year, so there is insufficient data to test for a corresponding increase in their foreign JT8D collection rates.

TABLE 8.1

COUNTS FOR UNITED STATES AND FOREIGN
EVENTS AND AIRCRAFT OPERATIONS BY YEAR AND ENGINE

	JT8D		CFM56	
	EVENTS OPERATIONS		EVENTS OPERATIONS	
<u>YEAR 1</u>				
UNITED STATES	39	1,160,091	40	353,656
FOREIGN	188	1,057,633	48	174,206
<u>YEAR 2</u>				
UNITED STATES	48	1,082,543	46	527,431
FOREIGN	238	1,062,971	63	302,415
<u>YEAR 3</u>				
UNITED STATES	45	1,007,797	61	697,654
FOREIGN	146	1,025,228	107	459,228

TABLE 8.2

CHI SQUARED TEST STATISTICS
FOR COMPARING ANNUAL INGESTION RATES

	UNITED STATES	FOREIGN
JT8D	2.17	19.21
CFM56	1.96	2.14

The change in collection rates for the JT8D could affect the test for size effect that was described in Section 4. In the first year report [1], both area and diameter provided adequate adjustments for the differences in ingestion rates between the two engines. In the 2-year report [2], area provided an adequate adjustment but diameter did not, while in the 3-year report, diameter provided an adequate adjustment but area did not. The lower third year collection rate would have an impact on the ingestion rate analysis so that investigations into the nature of engine size effects should be considered inconclusive.

Another check on the consistency of the data collection is to compare the birds that were identified in the 3 years. There were too many different species and locations of ingestions to allow comparisons of these features; however if the species identifications are reduced to bird weights, the cumulative weight distributions for the 3 years can be compared.

Table 8.3 provides a table of the cumulative weight distributions for each of the 3 years for birds ingested in the United States and for birds ingested in foreign countries. The data in Table 8.3 are plotted in Figures 8.1 and 8.2 to provide visual comparisons of the three yearly bird weight distributions for United States and foreign ingested birds. The distributions for the United States ingestions are moderately close, and the distributions for the foreign ingestions are very close.

A statistical measure of the closeness of the cumulative distributions plotted in Figures 8.1 and 8.2 is provided by a multi-sample extension of the Kolmogorov-Smirnov D test, described by Kiefer [13]. The D statistic is the maximum vertical distance between two observed cumulative distribution functions, and the T statistic described by Kiefer is the maximum vertical scatter among the three observed cumulative distribution functions. The formula for the T statistic is:

$$T = \max_x \sum_{j=1}^3 n_j [S_j(x) - \bar{S}(x)]^2, \quad (8.4)$$

where \max_x indicates the maximum over x , n_j is the sample size in year j , $S_j(x)$ is the observed cumulative distribution function in year j and $\bar{S}(x)$ is the observed cumulative distribution function for all 3 years combined.

The Kiefer goodness-of-fit test shows very good consistency between the 3 years for the ingested bird weight distribution. The T statistic for the United States bird ingestions is 0.721 and for the foreign bird ingestions is 0.579 which are the nineteenth and ninth percentiles of the null distribution of T. Large values of T indicate differences between the three distributions and the observed values given above are in the lower half of the likely range of T. There is no statistical evidence that the bird weight distributions have changed over the 3 year period.

The overall quality of the data collected for the FAA seems to be adequate. There is some confusion about the influence of the efforts of other agencies to collect bird ingestion data on the completeness of the FAA data. A better set of bird ingestion data might be created by combining data from ICAO; however, the compatibility of the ICAO data should be verified before analyzing the combined set of data.

TABLE 8.3

COMPARISON OF WEIGHT DISTRIBUTIONS BETWEEN
BIRDS INGESTED IN THE FIRST, SECOND, AND THIRD YEARS

WEIGHT (OZ)	UNITED STATES			FOREIGN		
	YEAR 1	YEAR 2	YEAR 3	YEAR 1	YEAR 2	YEAR 3
4	26.3	50.0	48.1	18.2	6.7	9.8
8	42.1	61.1	55.6	40.9	36.7	34.1
12	47.4	61.1	55.6	59.1	53.3	56.1
16	63.2	77.8	77.8	77.3	60.0	65.9
20	68.4	77.8	77.8	77.3	73.3	70.7
24	68.4	83.3	81.5	86.4	73.3	70.7
28	68.4	88.9	85.2	86.4	76.7	78.0
32	68.4	88.9	85.2	90.9	80.0	82.9
36	68.4	94.4	88.9	90.9	83.3	85.4
40	84.2	100.0	96.3	95.5	90.0	90.2
44	84.2	100.0	100.0	95.5	90.0	90.2
48	84.2	100.0	100.0	100.0	93.3	95.1
56	94.7	100.0	100.0	100.0	93.3	95.1
80	94.7	100.0	100.0	100.0	96.7	95.1
88	94.7	100.0	100.0	100.0	100.0	95.1
128	100.0	100.0	100.0	100.0	100.0	95.1
192	100.0	100.0	100.0	100.0	100.0	97.6
216	100.0	100.0	100.0	100.0	100.0	100.0

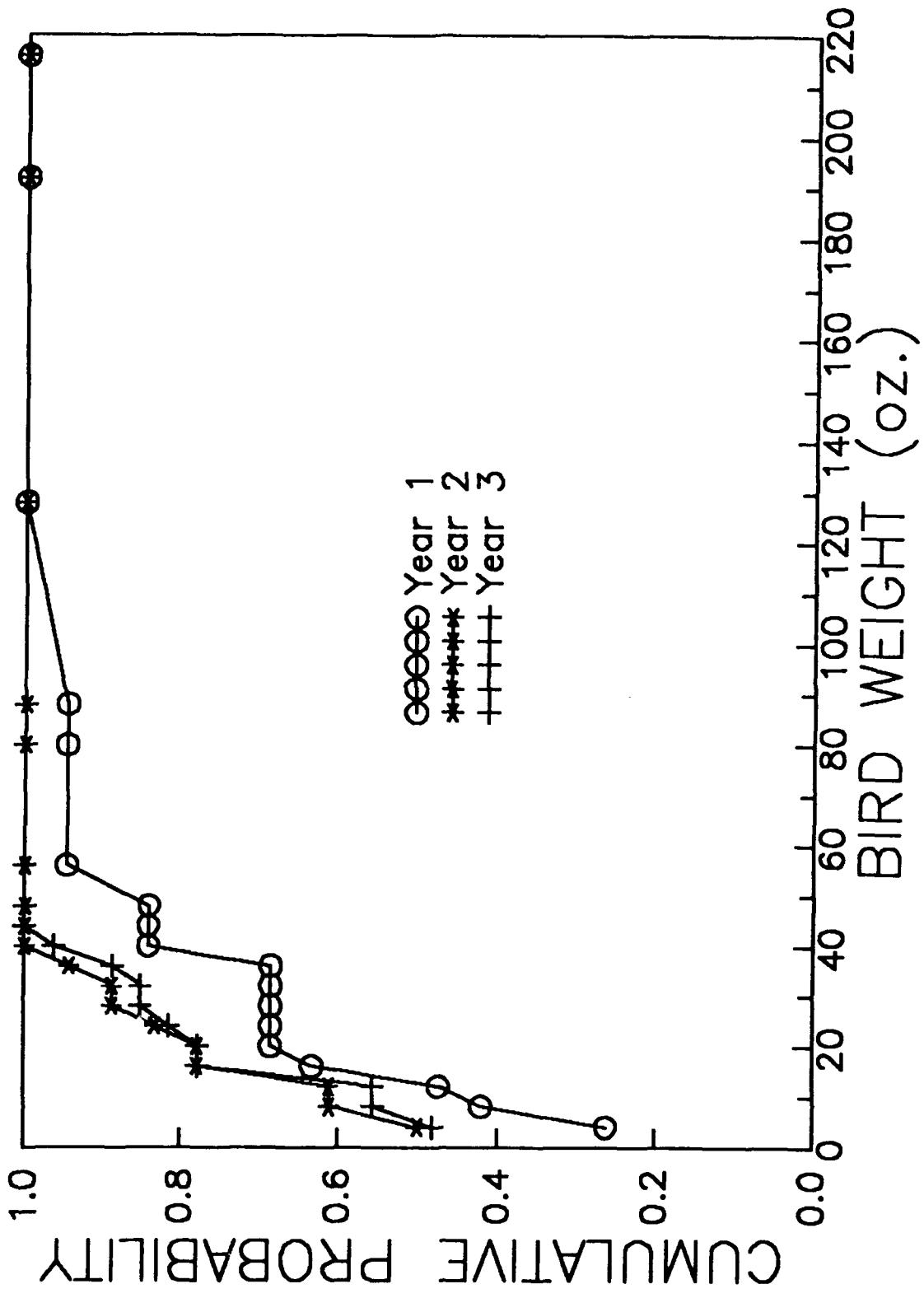


Figure 8.1 Comparison of the U.S. Bird Weight Distributions for the First, Second, and Third Years.

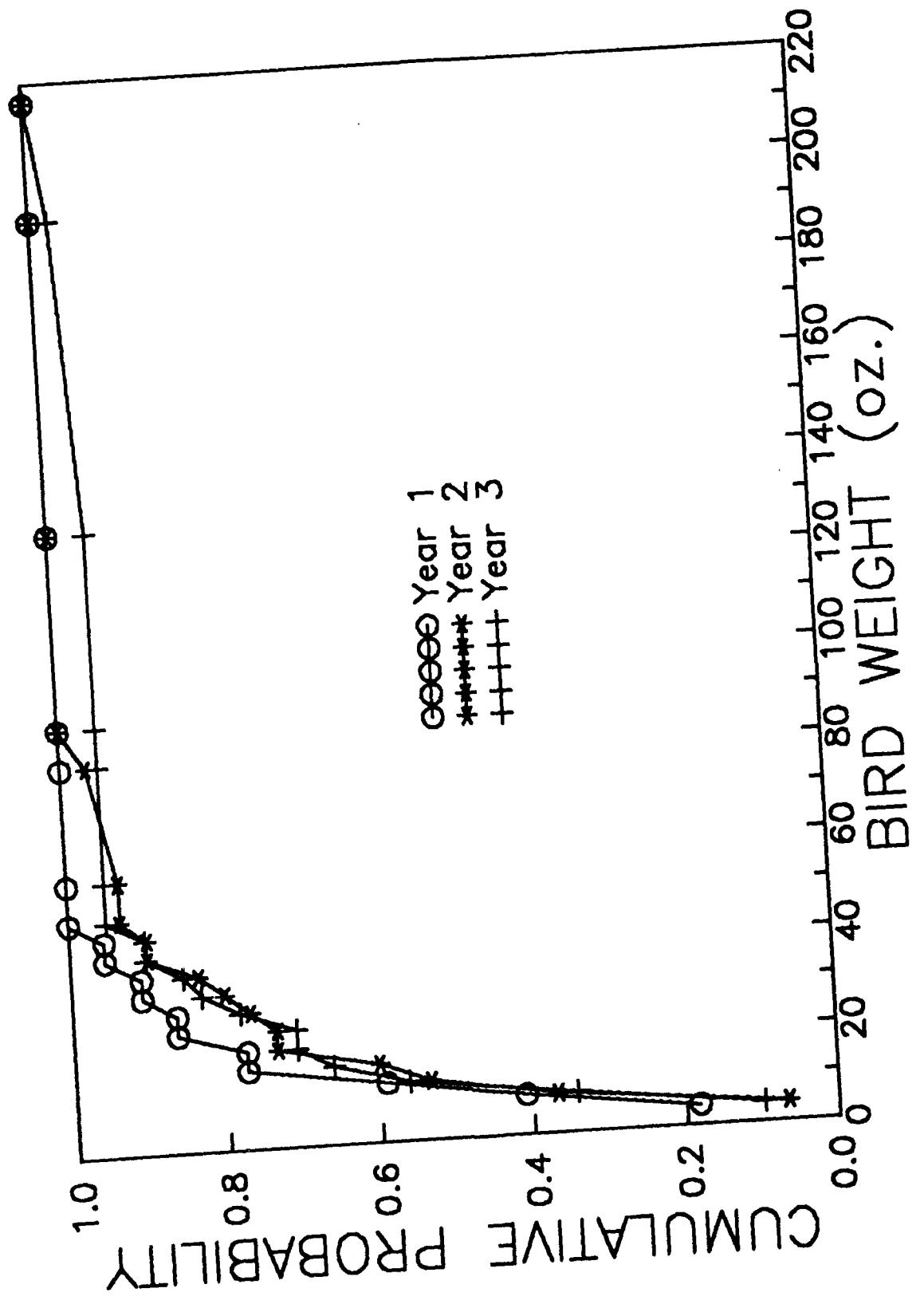


Figure 8.2 Comparison of the Foreign Bird Weight Distributions for the First, Second, and Third Years.

SECTION 9

CONCLUSIONS

This section summarizes conclusions based on the 3 years of data for the Boeing 737 aircraft.

Bird Descriptions

Gulls, doves, and lapwings are most often ingested.

There is a better species identification rate when the engine is damaged.

The weight of a bird most likely to be ingested outside the United States is significantly heavier than one most likely to be ingested within the United States.

Ingestion Rates

Bird ingestion events are seasonal with the highest rates in the summer and the lowest in the winter.

Bird ingestion events are much more likely to occur during daylight than at night.

Bird ingestion events can be modeled as a Poisson process.

Bird ingestion rates are proportional to the inlet size of the engine.

Airport Experiences

The foreign bird ingestion rate is significantly higher than the United States ingestion rate.

Effect of Flight

The probability that a crew action is required increases with the severity of engine damage.

The effects of flight that occur most often are air turnbacks and aborted takeoffs.

The probability of experiencing an involuntary in-flight engine shutdown, given a bird ingestion has occurred, is approximately one-half of one percent.

Engine Damage

Some types of engine damage are correlated with other types of damage.

The majority of engine bird ingestion events result in either minor or no engine damage.

The probability of any damage increases with the weight of the bird ingested.

The probability of engine damage, given a bird ingestion has occurred, is greater when the ingestion occurs during the takeoff and climb phases of flight than those that occur during approach and landing.

The probability of engine damage, given a bird ingestion has occurred, is greater when the aircraft airspeed is greater than or equal to 140 knots than those that occur at less than 140 knots.

Engine failure appears more likely to occur when multiple birds are ingested.

The mean or average weight of the birds that caused engine failures was significantly heavier than the mean weight for all bird ingestion events.

Engine failure is not necessarily associated exclusively with severe engine damage.

Engine failure appears more likely to occur during the takeoff phase of flight.

Engine failure can be caused by a bird ingestion in any bird weight range.

The majority of engine failures are caused by transverse fan blade fractures.

The probability of experiencing an engine failure, given a bird ingestion has occurred, is approximately 4 percent.

Probabilities of Ingestion

Bird ingestions are more likely during the takeoff and landing phases of an aircraft operation.

The worldwide probability of a bird ingestion as a function of bird weight for the B737 fleet remains relatively high up to 48 ounces.

Data Quality

The bird ingestion data collected during the third year of this study appears to be consistent with the data collected during the first and second years.

The overall quality of the bird ingestion data collected by the engine manufacturers for the FAA, is adequate for a meaningful statistical analysis.

SECTION 10

REFERENCES

1. Hovey, P., and Skinn, D., "A Study of the Engine Bird Ingestion Experience of the Boeing-737 Aircraft," DOT/FAA/CT-89/16, Department of Transportation, Federal Aviation Administration, October 1989.
2. Hovey, P., and Skinn, D., "Study of the Engine Bird Ingestion Experience of the Boeing-737 Aircraft (October 1986 - September 1988)," DOT/FAA/CT-89/29, Department of Transportation, Federal Aviation Administration, May 1990.
3. Frings, G., "A Study of Bird Ingestions into Large High Bypass Ratio Turbine Aircraft Engines," DOT/FAA/CT-84/13, Department of Transportation, Federal Aviation Administration, September 1984.
4. Martino, J., and Skinn, D., "Study of Bird Ingestions into Small Inlet Area, Aircraft Turbine Engines (May 1987 - April 1988)," DOT/FAA/CT-89/17, Department of Transportation, Federal Aviation Administration, December 1989.
5. Martino, J., Skinn, D., and Wilson, J., "Study of Bird Ingestions into Small Inlet Area Aircraft Turbine Engines (May 1987 - April 1989)," DAT/FAA/CT-90/13, Department of Transportation, Federal Aviation Administration, December 1990.
6. Berens, A.P., West, B.W., and Turella, M.A., "On a Probabilistic Model for Evaluating the Birdstrike Threat to Aircraft Crew Enclosures," UDR-TR-78-124, University of Dayton Research Institute, Dayton, OH, November 1978.
7. Skinn, D.A., and Berens, A.P., "Bird Avoidance Model (BAM) Phase I Report: Feasibility Demonstration," UDR-TR-80-122, University of Dayton Research Institute, Dayton, OH, November 1980.
8. Lilliefors, H.W., "On the Kilmogorov-Smirnov Test for the Exponential Distribution with Mean Unknown," Journal of the American Statistical Assoc., Vol. 64, March 1969, pp. 387-389.
9. Bertke, R.S., and Hovey, P.W., "Glass/Acrylic Coupon Impact Testing," UDR-TR-82-145, University of Dayton Research Institute, Dayton, OH, November 1982.
10. Cox, D.R., "The Analysis of Binary Data," Department of Mathematics Imperial College, Methuen & Co., Ltd., London, England, 1970.
11. Fienberg, S.E., "The Analysis of Cross-Classified Categorical Data," ISBN 0-262-06063-9, MIT Press, 1977.
12. Berens, A.P., Hovey, P.W., Donahue, R.M., and Craport, W.M., "User's Manual for Probability of Detection Software System (POD/SS)," UDR-TR-88-12, University of Dayton Research Institute, Dayton, OH, January 1988.
13. Kiefer, J., "K-Sample Analogues of the Kolmogorov-Smirnov and Cramer-von Mises Tests," Annals of Mathematical Statistics, Vol. 30, 1959, pp. 420-447.

SECTION 11

GLOSSARY

<u>Term</u>	<u>Definition of Term</u>
Aircraft Ingestion Event	Simultaneous ingestion of one or more birds into one or more engines of an aircraft.
Aircraft Operation	A nonstop aircraft flight from one airport to another. (Includes time from taxi-out from departure airport through taxi-in at arrival airport.)
Airport Operation	Takeoff (departure) from an airport or a landing (arrival) at an airport.
Engine Ingestion Event	Process whereby one or more birds pass through the engine inlet during engine operation.
Engine Operation	The participation of each engine of an aircraft in an aircraft operation (e.g., a twin engine aircraft would, ideally, experience two engine operations for each aircraft operation).
Ingested Bird	A bird having experienced the process of engine ingestion event.
Ingestion Rate	The number of aircraft or engine ingestion events per flight event. Flight event refers to aircraft, engine or airport operation. The components of ingestion rate are specified when used in the report. The influence of engine inlet area is not considered.
Normalized Ingestion Rate	Ingestion rate adjusted to a given nominal area. Allows statistical comparison of ingestion rates of engines with different inlet areas.

APPENDIX A

AIRPORTS WITH SCHEDULED BOEING-737 FLIGHTS AND/OR REPORTED BIRD INGESTION EVENTS

This appendix presents information about airports having scheduled Official Airline Guide (OAG) operations or aircraft ingestion events during the 3-year data collection period. The data are taken from a data base developed by the contractor. The data base contents are described below:

<u>COLUMN</u>	<u>DESCRIPTION OF COLUMN CONTENTS</u>
AIRPORT	3-letter airport code.
APTDEF	Location of airport.
HEMISPHR	Hemisphere in which AIRPORT is located. N - Northern Hemisphere S - Southern Hemisphere
CONUS	Indicates whether AIRPORT is located in the United States. YES - located in contiguous United States (48 states) NO - not located in the contiguous United States, but in the United States (Alaska or Hawaii) FGN - foreign airport
STGFY87	Scheduled OAG airport operations during first year.
ING1	Aircraft ingestion events during first year.
STGFY88	Scheduled OAG airport operations during second year.
ING2	Aircraft ingestion events during second year.
STGFY89	Scheduled OAG airport operations during third year.
ING3	Aircraft ingestion events during third year.
STG737	Scheduled OAG airport operations during 3-year period.
INGS	Aircraft ingestion events during 3-year period.

AIRPORT APTDEF		HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
AAE	ANNABA, ALGERIA	N	FGN	2393	0	2237	0	2061	0	6691	0
AAY	AL GHAYDAH, YEMEN	N	FGN	210	0	314	0	162	0	686	0
ABE	ALLENTOWN, PA, USA	N	YES	370	0	1573	0	2490	0	4433	0
ABJ	ABIDJAN, COTE D'IVOIRE (IVORY COAST)	N	FGN	1620	0	1806	0	1899	0	5325	0
ABQ	ALBUQUERQUE, NM, USA	N	YES	41942	0	43562	0	44079	1	129583	1
ABS	ABU SIMBEL, ARAB REP OF EGYPT	N	FGN	3366	0	5028	0	5496	0	13890	0
ABT	AL BABA, SAUDI ARABIA	N	FGN	1148	0	642	0	626	0	2416	0
ABV	ABUJA, NIGERIA	N	FGN	1240	0	1178	0	1160	0	3578	0
ABZ	ABERDEEN, SCOTLAND	N	FGN	1519	0	1636	0	2871	0	6026	0
ACA	ACAPULCO, MEXICO	N	FGN	126	0	322	1	120	0	568	1
ACC	ACCRA, GHANA	N	FGN	486	0	0	0	216	0	702	0
ACE	LANZAROTE, CANARY ISLANDS	N	FGN	76	0	688	0	1115	0	1879	0
ACK	NANTUCKET, MA, USA	N	YES	0	0	7	0	9	0	16	0
ACV	EUREKA ARCATA, CA, USA	N	YES	2616	0	739	0	0	0	3355	0
ADB	IZMIR, TURKEY	N	FGN	0	0	236	0	426	0	662	0
ADD	ADDIS ABABA, ETHIOPIA	N	FGN	148	0	1538	1	1585	0	3271	1
ADE	ADEN, YEMEN	N	FGN	1346	0	1022	0	1242	0	3610	0
ADK	ADAK ISLAND, AK, USA	N	NO	0	0	16	0	0	0	16	0
ADL	ADELAIDE, SA, AUSTRALIA	S	FGN	4738	1	5568	0	9550	0	19856	1
ADQ	KODIAK, AK, USA	NN	NO	2290	0	2500	0	2700	1	7490	1
ADZ	SAN ANDRES ISLAND, COLOMBIA	NN	FGN	526	0	624	0	700	0	1850	0
AEP	BUENOS AIRES - NEWBERRY, ARGENTINA	S	FGN	23291	0	22170	1	21296	0	66757	1
AES	AALESUND, NORWAY	NN	FGN	8988	0	8364	0	8060	0	25412	0
AGA	AGADOR, MOROCCO	N	FGN	601	0	684	0	1164	0	2449	0
AGP	MALAGA, SPAIN	N	FGN	2434	0	3226	0	3213	0	8873	0
AGR	AGRA, INDIA	N	FGN	1980	1	2074	1	1616	1	5670	3
AGS	AUGUSTA, GA, USA	N	YES	1579	0	1881	0	1270	0	4730	0
AHB	ABHA, SAUDI ARABIA	NN	FGN	2026	0	5425	0	5606	0	13057	0
AHU	AL HOCEIMA, MOROCCO	NN	FGN	292	0	338	0	346	0	976	0
AJA	AJACCIO, CORSICA, FRANCE	N	FGN	59	1	87	0	177	1	323	2
AJF	JOUF, SAUDI ARABIA	NN	FGN	1128	0	1258	0	1280	0	3666	0
AJU	ARACAJU, BRAZIL	SS	FGN	1460	0	2592	1	5242	0	9294	1
AKL	AUCKLAND, NEW ZEALAND	SS	FGN	16985	2	26503	0	26856	1	70344	3
AKN	KING SALMON, AS, USA	NN	NO	1444	0	1832	0	1956	0	5232	0
AKR	AKURE, NIGERIA	NN	FGN	238	0	354	0	244	0	836	0
ALB	ALBANY, NY, USA	NN	YES	4461	2	6510	0	6964	0	17935	2
ALC	ALICANTE, SPAIN	NN	FGN	148	0	1070	1	1796	1	3014	2
ALG	ALGIERS, ALGERIA	NN	FGN	14258	1	13443	0	13905	0	41606	1
ALY	ALEXANDRIA, ARA REP OF EGYPT	N	FGN	2104	0	1507	0	2123	0	5734	0
AMA	AMARILLO, TX, USA	N	YES	12811	0	11122	0	10270	0	34203	0
AMD	AHMEDABAD, INDIA	NN	FGN	5932	2	6180	4	4964	1	17076	7
AMH	AMMAN, JORDAN	NN	FGN	2131	0	1859	0	1684	0	5674	0
AMS	AMSTERDAM, NETHERLANDS	NN	FGN	19047	4	29304	4	41353	6	89704	14
ANC	ANCHORAGE, AK, USA	NN	NO	18977	0	17295	0	18186	0	54458	0
ANF	ANTOFAGASTA, CHILE	S	FGN	1434	0	1635	0	2356	0	5425	0
ANI	ANIAK, AS, USA	NN	NO	460	0	714	0	1108	0	2282	0
ANR	ANTWERP, BELGIUM	NN	FGN	540	0	0	0	0	0	540	0
ANU	ANTIGUA, WEST INDIES	NN	FGN	18	0	0	0	0	0	18	0
AOR	ALOR SETAR, MALAYSIA	NN	FGN	1886	1	1884	0	2154	0	5924	1
APL	NAMPULA, MOZAMBIQUE	SS	FGN	1144	0	1156	0	520	0	2820	0
APW	APIA, WESTERN SAMOA	SS	FGN	858	0	264	0	158	0	1280	0
AQI	QAISUMAH, SAUDI ARABIA	NN	FGN	494	0	552	0	642	0	1688	0
ARD	ALOR, INDONESIA	NN	FGN	0	1	0	0	0	0	0	1
ARI	ARICA, CHILE	SS	FGN	970	0	1308	0	1452	0	3730	0
ARN	STOCKHOLM ARLANDA, SWEDEN	NN	FGN	7556	0	8439	0	10086	0	26081	0
ASM	ASMARA, ETHIOPIA	NN	FGN	0	0	769	0	636	0	1405	0
ASP	ALICE SPRINGS, N.T., AUSTRALIA	SS	FGN	1816	0	3728	0	5198	1	10762	1
ASU	ASUNCION, PARAGUAY	SS	FGN	498	0	234	0	104	0	836	0
ASW	ASWAN, ARAB REP OF EGYPT	N	FGN	4968	0	7042	0	8616	0	20626	0
ATH	ATHENS, GREECE	NN	FGN	24758	0	25267	0	31341	1	81366	1
ATL	ATLANTA, GA, USA	NN	YES	42143	0	43773	0	47101	1	133017	1
ATM	ALTAMIRA, BRAZIL	S	FGN	416	0	420	0	416	0	1252	0
ATO	AMRITSAR, INDIA	NN	FGN	1846	0	1838	0	1460	0	5144	0
AUA	ARUBA, ARUBA	NN	FGN	50	0	9	0	32	0	91	0
AUH	ABU DHABI, U. A. EMIRATES	NN	FGN	4023	0	4381	0	4479	0	12883	0
AUS	AUSTIN, TX, USA	NN	YES	33326	1	31454	2	32211	0	96991	3
AUX	ARAGUAINA, BRAZIL	S	FGN	244	0	420	0	582	0	1246	0
AVL	ASHEVILLE, NC, USA	NN	YES	1298	0	1594	0	2212	0	5104	0
AVP	WILKES-BARRE/SCRANTON, PA, USA	N	YES	114	0	555	0	373	0	1042	0
AWZ	AHWAZ, IRAN	NN	FGN	0	0	0	0	724	0	724	0
AXD	ALEXANDROUPOLIS, GREECE	NN	FGN	908	0	1028	0	819	0	2755	0
AXT	AKITA, JAPAN	N	FGN	591	0	609	0	538	0	1738	0
AYT	ANTALYA, TURKEY	N	FGN	52	0	62	0	68	0	182	0
AZD	YAZD, IRAN	N	FGN	0	0	522	0	730	0	1252	0
AZO	KALAMAZOO, MI, USA	N	YES	2800	0	2802	0	2857	0	8459	0

AIRPORT APTDEF		HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
AZR	ADRAR, ALGERIA	N	FGN	818	0	718	0	732	0	2268	0
BAH	BAHRAIN, BAHRAIN	N	FGN	11933	1	10623	0	10944	0	33500	1
BAQ	BARRANQUILLA, COLOMBIA	N	FGN	105	0	104	0	104	0	313	0
BBI	BHUBANESWAR, INDIA	N	FGN	2086	1	2160	0	2008	0	6254	1
BCN	BARCELONA, SPAIN	N	FGN	4166	0	4707	0	7749	0	16622	0
BOH	BANDAR LENGEH, IRAN	N	FGN	1460	0	1464	0	832	0	3756	0
BDL	HARTFORD, CN, USA	N	YES	15001	0	14757	0	15366	0	45124	0
BDQ	VADODARA, INDIA	N	FGN	1925	0	1866	1	1888	0	5679	1
BDT	BADO LITE, ZAIRE	N	FGN	208	0	278	0	282	0	768	0
BEG	BELGRADE, YUGOSLAVIA	N	FGN	10759	1	13303	1	14455	1	38517	3
BEL	BELEM, BRAZIL	S	FGN	5505	0	9161	0	12314	0	26980	0
BEN	BENGHAZI, LIBYAN A JAMAHIRIYA	N	FGN	0	0	62	0	444	0	506	0
BET	BETHEL, AS, USA	N	NO	3190	0	3238	0	3158	0	9586	0
BEW	BEIRA, MOZAMBIQUE	S	FGN	1304	0	1112	0	1094	0	3510	0
BFL	BAKESFIELD, CA, USA	N	YES	2742	0	1037	0	0	0	3779	0
BNF	BLOEMFONTEIN, SOUTH AFRICA	S	FGN	3954	0	4710	1	5494	6	14158	7
BFS	BELFAST, N. IRELAND	N	FGN	1570	0	2915	2	6866	0	11351	2
BFX	BAFOUSSAM, CAMEROON	N	FGN	0	0	14	0	0	0	14	0
BGF	BANGUI, CEN. AFRICAN REPUBLIC	N	FGN	272	0	340	0	373	0	985	0
BGI	BARBADOS, BARBADOS	N	FGN	52	0	52	0	52	0	156	0
BGM	BINGHAMTON, NY, USA	N	YES	0	0	130	0	484	0	614	0
BGO	BERGEN, NORWAY	N	FGN	12038	0	14288	0	15923	0	42249	0
BGR	BANGOR, MA, USA	N	YES	0	0	0	0	204	0	204	0
BGW	BAGHDAD, IRAQ	N	FGN	0	0	31	0	38	0	69	0
BHH	BISHA, SAUDI ARABIA	N	FGN	1740	0	1779	0	1517	0	5036	0
BHI	BAHIA BLANCA, ARGENTINA	S	FGN	2162	0	2412	0	2400	3	6974	3
BHJ	BHUJ, INDIA	N	FGN	730	0	732	0	730	0	2192	0
BHM	BIRMINGHAM, AL, USA	N	YES	6048	2	11193	1	9467	1	26708	4
BHO	BHOPAL, INDIA	N	FGN	1828	0	2462	1	1924	1	6214	2
BHU	BHAVNAGAR, INDIA	N	FGN	730	0	732	0	538	0	2000	0
BHX	BIRMINGHAM, ENGLAND (UK)	N	FGN	2307	1	2630	1	3753	0	8690	2
BHZ	BELO HORIZONTE, BRAZIL	S	FGN	0	0	0	0	0	1	0	1
BIA	BASTIA, CORSICA, FRANCE	N	FGN	234	0	300	0	200	0	734	0
BIL	BILLINGS, MT, USA	N	YES	7285	0	4583	0	3874	0	15742	0
BIO	BILBAO, SPAIN	N	FGN	622	0	628	0	677	0	1927	0
BIQ	BIARRITZ, FRANCE	N	FGN	52	0	52	0	52	0	156	0
BIS	BISMARCK, ND, USA	N	YES	3396	0	3760	0	2746	0	9902	0
BJL	BANJUL, GAMBIA	N	FGN	472	0	420	0	420	1	1312	1
BJM	BUJUMBURA, BURUNDI	S	FGN	245	0	245	0	384	0	874	0
BJR	BAHAR DAR, ETHIOPIA	N	FGN	0	0	572	1	296	0	868	1
BKI	KOTA KINABALU, SABAH, MALAYSIA	N	FGN	8699	0	9134	0	11424	0	29257	0
BKK	BANGKOK, THAILAND	N	FGN	7329	0	7596	0	7058	0	21983	0
BKO	BAMAKO, MALI	N	FGN	50	0	54	0	82	0	186	0
BKY	BUKAVU, ZAIRE	S	FGN	104	0	106	0	72	0	282	0
BLI	BELLINGHAM, WA, USA	N	YES	0	0	2	0	237	0	239	0
BLL	BILLUND, DENMARK	N	FGN	2177	0	2178	0	2393	0	6748	0
BLO	BOLOGNA, ITALY	N	FGN	310	0	374	0	634	0	1318	0
BLR	BANGALORE, INDIA	N	FGN	5886	3	8160	2	9204	2	23250	7
BME	BROOME, W.A., AUSTRALIA	S	FGN	0	0	0	0	2	0	2	0
BNA	NASHVILLE, TN, USA	NN	YES	17920	0	22380	1	21447	0	61747	1
BND	BANDAR ABBAS, IRAN	N	FGN	1460	0	1922	0	1354	0	4736	0
BNE	BRISBANE, QLD, AUSTRALIA	S	FGN	12830	0	15610	2	21839	0	50279	2
BNI	BENIN CITY, NIGERIA	N	FGN	2127	0	1875	0	1666	0	5668	0
BNJ	BONN, FRG	N	FGN	0	0	0	0	0	0	0	0
BOD	BORDEAUX, FRANCE	N	FGN	688	0	790	0	1016	0	2494	0
BOH	BOURNEMOUTH, ENGLAND, UK	N	FGN	0	0	0	0	0	1	0	1
BOI	BOISE, ID, USA	N	YES	5399	0	5655	0	8309	0	19363	0
BOM	BOMBAY, INDIA	N	FGN	16848	2	15854	2	15490	0	48192	4
BOO	BODO, NORWAY	N	FGN	2868	0	3254	0	3286	0	9408	0
BOS	BOSTON, MA, USA	N	YES	30820	0	34903	1	37878	0	103601	1
BCR	SAN CARLOS DE BARILOCHE, ARGENTINA	S	FGN	1663	0	1656	0	1176	0	4495	0
BRE	BREMEN, FED REP OF GERMANY	NN	FGN	4526	0	5729	0	5530	2	15785	2
BRN	BRISTOL, ENGLAND (UK)	NN	FGN	2	1	0	2	16	0	18	3
BRU	BRUSSELS, BELGIUM	NN	FGN	31942	2	32748	4	36110	3	100800	9
BRW	BARROW, AS, USA	N	NO	1897	0	1960	0	1946	0	5803	0
BSB	BRASILIA, BRAZIL	S	FGN	22788	0	30251	0	35278	0	88317	0
BSK	BISKRA, ALGERIA	N	FGN	0	0	0	0	96	0	96	0
BSL	BASEL/MULHOUSE, SWITZERLAND	N	FGN	554	0	538	0	528	0	1620	0
BTM	BUTTE, MT, USA	N	YES	1460	0	1464	0	1454	0	4378	0
BTR	BATON ROUGE, LA, USA	N	YES	2944	0	2065	0	1273	0	6282	0
BTV	BURLINGTON, VT, USA	N	YES	2544	0	2678	0	6126	0	11348	0
BUD	BUDAPEST, HUNGARY	N	FGN	1660	0	1468	1	4764	0	7892	1
BUE	BUENOS AIRES, ARGENTINA	S	FGN	0	0	0	1	0	0	0	1
BUF	BUFFALO, NY, USA	N	YES	17704	0	16940	0	14779	0	49423	0
BWQ	BULAWAYO, ZIMBABWE	S	FGN	1834	0	2870	0	2808	0	7512	0

AIRPORT APTDEF		HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STGF737	ING5
BUR	BURBANK, CA, USA	N	YES	11187	0	14262	0	20498	0	45947	0
BUX	BUNA, ZAIRE	N	FGN	210	0	208	0	166	0	584	0
BUZ	BUSHEHR, IRAN	N	FGN	88	0	24	0	0	0	112	0
BVB	BOA VISTA, BRAZIL	N	FGN	1314	0	1426	0	1914	0	4654	0
BVH	VITHENA, BRAZIL	S	FGN	0	0	62	0	254	0	316	0
BWI	BALTIMORE, MD, USA	N	YES	54435	1	60614	0	71566	0	186615	1
BWN	BASERI BEGAWAN, BRUNEI DARUSSALAM	N	FGN	2951	0	2782	0	3248	0	8981	0
BXO	BISSAU, GUINEA BISSAU	N	FGN	20	0	80	0	0	0	100	0
BZE	BELIZE CITY, BELIZE	N	FGN	3647	0	4416	0	5541	0	13604	0
BZN	BOZEMAN, MT, USA	N	YES	5200	0	4588	0	5762	0	15550	0
BZR	BEZIERS, FRANCE	N	FGN	0	0	0	0	1	0	1	0
BZV	BRAZZAVILE, PEOP REP OF CONGO	S	FGN	1406	0	1321	0	1180	0	3907	0
CAB	CABINDA, ANGOLA	S	FGN	1042	0	966	0	730	0	2738	0
CAE	COLUMBIA, SC, USA	N	YES	8213	0	8051	0	4297	0	20561	0
CAG	CAGLIARI, ITALY	N	FGN	0	0	0	1	0	0	0	1
CAI	CAIRO, ARAB REP OF EGYPT	N	FGN	8057	0	8970	0	10132	0	27159	0
CAK	AKRON/CANTON, OH, USA	N	YES	2241	0	2582	0	1398	0	6221	0
CAN	GUANGZHOU, P. R. CHINA	N	FGN	13955	0	16177	0	14550	0	44682	0
CAS	CASABLANCA, MOROCCO	N	FGN	0	0	8	1	8	0	16	1
CAY	CAYENNE, FRENCH GUIANA	N	FGN	208	0	367	0	415	0	990	0
CBD	CAR NICOBAR, INDIA	N	FGN	40	0	106	0	104	0	250	0
CBH	BECHAR, ALGERIA	N	FGN	1455	0	1258	0	1274	0	3987	0
CBO	CALABAR, NIGERIA	N	FGN	1935	0	1783	0	1221	0	4939	0
CBR	CANBERRA, A.C.T., AUSTRALIA	S	FGN	5600	1	5064	0	6719	0	17383	1
CCJ	CALICUT, INDIA	N	FGN	0	0	174	0	536	0	710	0
CCP	CONCEPCION, CHILE	S	FGN	1184	0	1484	0	1444	0	4112	0
CCR	CONCORD, CA, USA	N	YES	0	0	0	0	37	0	37	0
CCS	CARACAS, VENEZUELA	N	FGN	0	0	52	0	52	0	104	0
CCU	CALCUTTA, INDIA	N	FGN	10798	2	11583	1	11041	0	33422	3
CDG	PARIS DE GAULLE, FRANCE	N	FGN	25514	1	28834	2	32635	0	86983	3
CDV	CORDOVA, AS, USA	N	NO	1514	0	1516	0	1512	0	4542	0
CEO	WACO KUNGO, ANGOLA	S	FGN	10	0	4	0	0	0	14	0
CFU	CORFU, GREECE	N	FGN	746	0	1152	0	1224	0	3122	0
CGB	CUIABA MATO GROSSO, BRAZIL	S	FGN	9184	0	8652	0	8360	0	26196	0
CGH	SAO PAULO-CONGONHAS, BRAZIL	S	FGN	1082	0	2410	0	2600	0	6092	0
CGK	JAKARTA-SOEKARNO, INDONESIA	S	FGN	626	0	630	0	687	0	1943	0
CGN	COLOGNE BONN, FRG	N	FGN	18161	1	19445	0	19597	1	57203	2
CGO	ZHENGZHOU, P. R. CHINA	N	FGN	208	0	394	0	341	0	943	0
CGP	CHITTAGONG, BANGLADESH	N	FGN	0	0	0	0	80	0	80	0
CGQ	CHANGCHUN, P. R. CHINA	N	FGN	62	0	70	0	268	0	400	0
CGR	CAMPO GRANDE, BRAZIL	S	FGN	6770	0	7800	3	8854	0	23424	3
CHA	CHATTANOOGA, TN, USA	N	YES	1618	0	1704	0	984	0	4306	0
CHC	CHRISTCHURCH, NEW ZEALAND	S	FGN	17095	7	24202	0	26870	0	68167	7
CHM	CHIMBOTE, PERU	S	FGN	0	0	0	0	98	0	98	0
CHO	CHARLOTTESVILLE, VA, USA	N	YES	1814	0	808	0	831	0	3453	0
CHQ	CHANIA, CRETE, GREECE	N	FGN	856	0	793	0	1554	0	3203	0
CHS	CHARLESTON, SC, USA	N	YES	7219	0	8528	0	8385	0	24132	0
CID	CEDAR RAPIDS/IAWA CITY, IA, USA	N	YES	3800	0	2995	0	3565	1	10360	1
CIX	CHICLAYO, PERU	S	FGN	286	0	450	0	800	0	1536	0
CJB	COIMBATORE, INDIA	N	FGN	1528	0	1674	2	1460	0	4662	2
CJC	CALAMA, CHILE	S	FGN	626	0	420	0	630	0	1676	0
CJU	CHEJU, REP OF KOREA	N	FGN	0	0	0	0	1708	1	1708	1
CKG	CHONGQING, P. R. CHINA	N	FGN	714	0	787	0	1138	0	2639	0
CKS	CARAJAS, BRAZIL	S	FGN	417	0	417	0	188	0	1022	0
CKY	CONAKRY, GUINEA	N	FGN	550	0	707	0	947	0	2204	0
CLE	CLEVELAND, OH, USA	N	YES	24028	1	40166	1	55625	1	119819	3
CLT	CHARLOTTE, NC, USA	N	YES	95251	2	113302	1	122448	0	331001	3
CMB	COLOMBO, SRI LANKA	N	FGN	3021	0	3078	0	3254	1	9353	1
CMG	CORUMBA, MATO GROSSO, BRAZIL	S	FGN	1460	1	1464	0	1068	0	3992	1
CMH	COLUMBUS, OH, USA	N	YES	8004	0	9329	0	9980	0	27313	0
CMI	CHAMPAIGN, IL, USA	N	YES	2186	0	2195	0	2188	0	6569	0
CMN	MOHAMEDV, CASABLANCA, MOROCCO	N	FGN	4767	0	6241	0	6621	0	17629	0
CND	CONSTANTO, ROMANIA	N	FGN	0	0	0	0	0	0	0	0
CNF	BELO HORIZONTE-CONFINS, BRAZIL	S	FGN	19683	0	19554	0	17047	0	56284	0
CNQ	CORRIENTES, ARGENTINA	S	FGN	1100	0	544	0	312	0	1956	0
CNS	CAIRNS, QLD, AUSTRALIA	S	FGN	4850	1	6049	0	7815	0	18714	1
CNX	CHIANG MAI, THAILAND	N	FGN	728	0	435	0	18	0	1181	0
COK	COCHIN, INDIA	N	FGN	5457	1	4646	2	4380	0	14483	3
COO	COTONOU, BENIN	N	FGN	1120	0	1038	0	838	0	2996	0
COR	CORDOBA, ARGENTINA	S	FGN	6772	0	6194	1	5551	0	18517	1
COS	COLORADO SPRINGS, CO, USA	N	YES	8004	0	8313	1	10804	0	27121	1
CPH	COPENHAGEN, DENMARK	N	FGN	11419	1	14184	0	15634	1	41237	2
CPO	CUPIATO, CHILE	S	FGN	0	0	326	0	632	0	952	0
CPO	CAMPINAS, BRAZIL	S	FGN	1056	0	1207	0	889	0	3152	0
CPR	CASPER, WY, USA	N	YES	4230	0	2902	0	2170	0	9302	0

AIRPORT APTDEF		HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	ING5
CPT	CAPE TOWN, SOUTH AFRICA	S	FGN	8545	1	10490	0	11738	2	30773	3
CPV	CAMPINA GRANDE, BRAZIL	S	FGN	626	0	628	0	624	0	1878	0
CRD	COMODORO RIVADAVIA, ARGENTINA	S	FGN	2553	0	2041	0	1509	0	6103	0
CRP	CORPUS CHRISTI, TX, USA	N	YES	5584	0	5292	0	5290	1	16166	1
CRW	CHARLESTON, WV, USA	N	YES	4478	0	5070	1	2915	0	12463	1
CTA	CATANIA, ITALY	N	FGN	252	0	665	0	838	0	1755	0
CTC	CATAMARCA, ARGENTINA	S	FGN	778	0	782	1	730	0	2290	1
CTG	CARTAGENA, COLOMBIA	N	FGN	105	0	104	0	104	0	313	0
CTS	SAPPORO-CHITOSE, JAPAN	N	FGN	1398	0	2908	0	2784	0	7090	0
CTU	CHENGDU, P.R. CHINA	N	FGN	2138	1	1728	0	2749	1	6615	2
CUN	CANCUM, MEXICO	N	FGN	634	0	1212	0	602	0	2448	0
CUR	CURACAO, NETH ANTILLES	N	FGN	20	0	0	0	0	0	20	0
CUT	CUTRAL-CO, ARGENTINA	S	FGN	0	0	18	0	0	0	18	0
CVG	CINCINNATI, OH, USA	N	YES	14496	0	18777	0	16460	0	49733	0
CVT	COVENTRY, ENG, UK	N	FGN	0	0	0	0	42	0	42	0
CWB	CURITIBA, PARANA, BRAZIL	S	FGN	6532	0	8720	0	10110	2	25362	2
CWL	CARDIFF, WALES, UK	N	FGN	0	0	0	1	0	0	0	1
CXI	CHRISTMAS ISLAND, REP OF KIRIBATI	N	FGN	106	0	104	0	104	0	314	0
CYI	CHIAYI, TAIWAN	N	FGN	730	0	732	0	730	0	2192	0
CZL	CONSTANTINE, ALGERIA	N	FGN	3352	0	3129	0	3101	0	9582	0
CZS	CRUZEIRO DO SUL, ACRE, BRAZIL	S	FGN	344	0	436	0	454	0	1234	0
CZX	CHANGZHOU, P. R. CHINA	N	FGN	208	0	227	0	224	0	659	0
DAB	DAYTONA BEACH, FL, USA	N	YES	3532	1	4032	0	2840	1	10404	2
DAC	DHAKA, BANGLADESH	N	FGN	934	0	734	0	789	0	2457	0
DAL	LOVE DALLS/FT. WORTH, TX, USA	N	YES	75124	4	76295	3	76191	3	227610	10
DAM	DAMASCUS, SYRIA	N	FGN	523	0	883	0	905	0	2311	0
DAR	DAR ES SALAAM, TANZANIA	S	FGN	3407	0	2968	0	2961	0	9336	0
DAY	DAYTON, OH, USA	N	YES	37652	1	43020	2	48201	1	128873	4
DBV	DUBROVNIK, YUGOSLAVIA	N	FGN	1806	0	2366	0	2730	0	6902	0
DCA	NATIONAL, WASHINGTON, DC, USA	N	YES	22108	0	26412	0	30911	1	79431	1
DEC	DECATUR, IL, USA	N	YES	0	0	0	0	0	0	0	0
DEL	DELHI, INDIA	N	FGN	15987	0	16401	3	17645	2	50033	5
DEN	STAPLETON INT'L, DENVER, CO, USA	N	YES	112673	2	113634	2	106309	0	332616	4
DET	DETROIT CITY, MI, USA	N	YES	0	0	2064	0	10902	1	12966	1
DEU	SOMEWHERE OVER GERMANY	N	FGN	0	0	0	1	0	0	0	1
DFW	DALLAS/FT WORTH, TX, USA	N	YES	51130	1	48254	1	53615	0	152999	2
DHA	DHAHRAN, SAUDI ARABIA	N	FGN	7902	0	6474	0	6302	0	20678	0
DIB	DIBRUGARH, INDIA	N	FGN	816	0	864	0	852	0	2532	0
DIE	ANTSIRANANA, MADAGASCAR	S	FGN	610	0	610	0	576	0	1796	0
DIR	DIRE DAWA, ETHIOPIA	N	FGN	38	0	628	0	1100	0	1766	0
DJE	DJERBA, TUNISIA	N	FGN	547	0	267	0	303	0	1117	0
DJG	DJANET, ALGERIA	N	FGN	466	0	532	0	564	0	1562	0
DKR	DAKAR, SENEGAL	N	FGN	467	0	580	0	653	0	1700	0
DLA	DOUALA, REP OF CAMEROON	N	FGN	5262	0	4691	0	4654	0	14607	0
DLC	DALIAN, P. R. CHINA	N	FGN	0	0	44	0	130	0	174	0
DLG	DILLINGHAM, AS, USA	N	NO	1444	0	1622	0	1660	0	4726	0
DLH	DULUTH, MN, USA	N	YES	0	0	0	0	0	1	0	1
DMU	DIMAPUR, INDIA	N	FGN	0	0	0	0	326	0	326	0
DOD	DODOMA, TANZANIA	S	FGN	16	0	0	0	0	0	16	0
DOH	DOHA, QATAR	N	FGN	8859	0	9310	0	9325	0	27494	0
DPS	DENPASAR, INDONESIA	S	FGN	104	0	104	0	106	0	314	0
DRO	DURANGO, CO, USA	N	YES	2233	0	1462	0	1442	0	5137	0
DRW	DARWIN, N.T., AUSTRALIA	S	FGN	1107	0	2092	0	2513	0	5712	0
DSM	DES MOINES, IO, USA	N	YES	7748	0	9329	0	7785	0	24862	0
DTW	WAYNE CO, DETROIT, MI, USA	N	YES	16765	0	24028	0	21130	1	61923	1
DUB	DUBLIN, REPUBLIC OF IRELAND	N	FGN	19308	1	23823	1	28519	1	71650	3
DUD	DUNEDIN, NEW ZEALAND	S	FGN	4145	0	4379	1	5890	0	14414	1
DUR	DURBAN, SOUTH AFRICA	S	FGN	6925	2	7739	2	9624	1	24288	5
DUS	DUESSELDORF, FRG	N	FGN	30119	2	32964	5	33450	6	96533	13
DUT	DUTCH HARBOR, AS, USA	N	NO	828	0	1116	0	1432	0	3376	0
DXB	DUBAI, U. A. EMIRATES	N	FGN	3134	0	2234	0	2719	0	8087	0
EAM	NEJRAN, SAUDI ARABIA	N	FGN	2392	0	2412	0	2552	1	7356	1
EBB	ENTEBOBE KAMPALA, UGANDA	N	FGN	39	0	167	0	459	0	665	0
EBD	EL OBEID, SUDAN	N	FGN	632	0	968	0	512	0	2112	0
EBJ	ESBJERG, DENMARK	N	FGN	482	0	284	0	156	0	922	0
EDI	EDINBURGH, SCOTLAND	N	FGN	1040	0	1988	0	7123	1	10151	1
EFL	KEFALONIA, GREECE	N	FGN	780	0	786	0	776	0	2342	0
EJH	WEDJAH, SAUDI ARABIA	N	FGN	784	0	736	0	730	0	2250	0
ELF	EL FASHER, SUDAN	N	FGN	0	0	8	0	164	0	172	0
ELG	EL GOLEA, ALGERIA	N	FGN	416	0	416	0	416	0	1248	0
ELM	ELMIRA, NY, USA	N	YES	0	0	260	0	0	0	260	0
ELP	EL PASO, TX, USA	N	YES	38902	0	39117	0	41757	0	119776	0
ELQ	GASSIM, SAUDI ARABIA	N	FGN	4652	0	4072	0	3224	0	11948	0
ELS	EAST LONDON, SOUTH AFRICA	S	FGN	9987	3	11104	0	10476	2	31567	5
ELU	EL OUED, ALGERIA	N	FGN	288	0	312	0	426	0	1026	0

AIRPORT APTDEF	HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STGFY87	ING5
EMA EAST MIDLANDS, ENGLAND	N	FGN	291	0	269	0	322	2	882	2
ENU ENUGU, NIGERIA	N	FGN	3138	0	2980	0	2199	0	8317	0
EQS ESQUEL, ARGENTINA	S	FGN	1116	0	1066	0	850	0	3032	0
ERI ERIE, PA, USA	N	YES	1772	0	1618	0	1535	0	4925	0
ESB ANKARA-ESENBOGA, TURKEY	N	FGN	0	0	695	0	1329	0	2024	0
ESR EL SALVADOR, CHILE	S	FGN	836	0	772	0	728	0	2336	0
ETH ELAT, ISRAEL	N	FGN	4	0	14	0	2	0	20	0
EUG EUGENE, OR, USA	N	YES	3493	0	2908	0	5201	0	11602	0
EUN LAAYOUNE, MOROCCO	N	FGN	244	0	503	0	317	0	1064	0
EVE EVENES, NORWAY	N	FGN	1520	0	1874	0	1778	0	5172	0
EVV EVANSVILLE, IN, USA	N	YES	2468	0	2519	0	1898	0	6885	0
EWR NEWARK, NEW YORK, NY, USA	N	YES	78323	1	85323	2	83555	1	247201	4
EZE BUENOS AIRES-EZEIZA ARPT, ARGENTINA	S	FGN	424	1	838	0	1483	0	2745	1
FAE FAROE ISLANDS, DENMARK	N	FGN	756	0	837	0	752	0	2345	0
FAI FAIRBANKS, AK, USA	N	NO	3674	0	3816	0	3756	0	11246	0
FAO FARO, PORTUGAL	N	FGN	1069	0	1712	1	1300	0	4081	1
FAR FARGO, ND, USA	N	YES	1561	0	383	0	445	0	2389	0
FAT FRESNO, CA, USA	N	YES	9993	1	6833	1	4983	0	21809	2
FAY FAYETTEVILLE, NC, USA	N	YES	3260	0	3643	0	2786	0	9689	0
FBM LUBUMBASHI, ZAIRE	S	FGN	262	0	378	0	444	0	1084	0
FBU FORNEBU, OSLO, NORWAY	N	FGN	11420	0	29599	0	33347	0	74366	0
FCA KALISPELL GLACIER NAT'L OK, MT, USA	N	YES	1460	0	1460	0	1067	0	3987	0
FCO DA VINCI, ROME, ITALY	N	FGN	4538	0	6614	1	8484	1	19636	2
FEZ FEZ, MOROCCO	N	FGN	146	0	408	0	640	0	1194	0
FIH KINSHASA, ZAIRE	S	FGN	2324	0	2776	0	2920	0	8020	0
FJR AL FUJAIRAH, U.A.E.	N	FGN	0	0	208	0	225	0	433	0
FKI KISANGANI, ZAIRE	N	FGN	1170	0	1596	0	1388	0	4154	0
FLL FT LAUDERDALE, FL, USA	N	YES	12566	1	12687	0	17037	0	42290	1
FLN FLORIANOPOLIS, BRAZIL	S	FGN	4180	0	5040	0	3909	0	13129	0
FMA FORMOSA, ARGENTINA	S	FGN	682	0	696	1	648	0	2026	1
FMI KALEMIE, ZAIRE	S	FGN	524	0	440	0	414	0	1378	0
FMO MUNSTER, GERMANY	N	FGN	0	0	0	0	69	0	69	0
FNA FREETOWN, SIERRA LEONE	N	FGN	112	0	0	0	0	0	112	0
FNC FUNCHAL - MADEIRA, PORTUGAL	N	FGN	3737	1	4944	0	6276	1	14957	2
FNT FLINT, MI, USA	N	YES	2186	0	2300	0	2923	1	7409	1
FOC FUZHOU, P. R. CHINA	N	FGN	534	0	1116	0	1082	0	2732	0
FOE FORBES, TOPEKA, KS, USA	N	YES	1407	0	62	0	0	0	1469	0
FOR FORTALEZA, CEARA, BRAZIL	S	FGN	4798	0	6068	0	8582	0	19448	0
FPO FREEPORT, BAHAMAS	N	FGN	2666	0	5156	0	4876	0	12698	0
FRA FRANKFURT, FRG	N	FGN	52274	8	56256	2	64168	6	172698	16
FRL FORLI, ITALY	N	FGN	0	0	0	0	2	0	2	0
FSD SIOUX FALLS, SD, USA	N	YES	6410	0	2897	0	5603	0	14910	0
FTU FT DAUPHIN, MADAGASCAR	S	FGN	332	0	328	0	330	0	990	0
FUE FUERTEVENTURA, CANARY IS.	N	FGN	0	0	216	0	228	0	444	0
FUK FUKUOKA, JAPAN	N	FGN	730	0	410	0	62	0	1202	0
FWA FT WAYNE, IN, USA	N	YES	2580	0	2344	0	2444	0	7368	0
GAJ YAMAGATA, HONSHU, JAPAN	N	FGN	1154	0	1426	1	1330	0	3910	1
GAL GALENA, AS, USA	N	NO	0	0	270	0	182	0	452	0
GAU GAUHATI, INDIA	N	FGN	3934	1	5832	0	6143	0	15909	1
GBE GABORONE, BOTSWANA	S	FGN	527	0	500	0	246	0	1273	0
GCI GUERNSEY, CHANNEL IS, UK	N	FGN	0	0	0	0	40	0	40	0
GDL GUADALAJARA, MEXICO	N	FGN	0	0	38	0	92	0	130	0
GEG SPOKANE, WA, USA	N	YES	8549	0	5588	0	6999	0	21136	0
GEO GEORGETOWN, GUYANA	N	FGN	0	0	8	0	28	0	36	0
GHA GHARDAIA, ALGERIA	N	FGN	1014	0	858	0	1032	0	2904	0
GHB GOVERNORS HARBOUR, BAHAMAS	N	FGN	36	0	0	1	0	0	36	1
GHU GUALEGUAYCHU, ARGENTINA	S	FGN	0	1	0	0	0	0	0	1
GIB GIBRALTAR, GIBRALTAR	N	FGN	1788	0	2904	0	3440	0	8132	0
GIG RIO DE JANEIRO INT'L, BRAZIL	S	FGN	27048	0	33116	1	34612	1	94776	2
GIZ GIZAN, SAUDI ARABIA	N	FGN	5781	0	6019	0	6070	0	17870	0
GJT GRAND JUNCTION, CO, USA	N	YES	2416	0	3572	0	2962	0	8950	0
GLA GLASGLOW, SCOTLAND	N	FGN	687	0	1605	0	5763	0	8055	0
GMA GEMENA, ZAIRE	N	FGN	312	0	332	0	252	0	896	0
GOA GENOA, ITALY	N	FGN	292	1	267	0	1064	0	1623	1
GOI GOA, INDIA	N	FGN	1798	0	1554	0	1982	1	5334	1
GOM GOMA, ZAIRE	S	FGN	104	0	446	0	554	0	1104	0
GOP GORAKHPUR, INDIA	N	FGN	486	0	328	0	404	0	1218	0
GOT GOTHENBURG, SWEDEN	N	FGN	3846	0	4517	2	5431	0	13794	2
GOU GAROUA, REP OF CAMEROON	N	FGN	1954	0	1822	0	1338	0	5114	0
GOV GOVE, N.T., AUSTRALIA	S	FGN	314	0	600	0	624	0	1538	0
GRB GREEN BAY, WI, USA	N	YES	605	0	0	0	0	0	605	0
GRJ GEORGE, SOUTH AFRICA	S	FGN	2178	0	2262	0	2253	0	6693	0
GRR GRAND RAPIDS, MI, USA	N	YES	4831	0	3497	0	4465	0	12793	0
GRU SAO PAULO-GUARULHOS, BRAZIL	S	FGN	41061	0	45163	0	47825	0	134049	0
GRZ GRAZ, AUSTRIA	N	FGN	619	1	304	0	562	1	1485	2

AIRPORT APTDEF

HEMISPHR CONUS STGFY87 ING1 STGFY88 ING2 STGFY89 ING3 STG737 INGS

GSO	GREENSBORO/HPT/Win-Salem, NC, USA	N	YES	18586	0	14989	0	15677	0	49252	0
GSP	GREENVILLE/SPARTANBURG, SC, USA	N	YES	1508	0	2324	0	2292	1	6124	1
GTF	GREAT FALLS, MT, USA	N	YES	4356	0	3398	0	2992	0	10746	0
GUA	GUATEMALA CITY, GUATEMALA	N	FGN	1667	0	2848	0	3522	0	8037	0
GUM	GUAM, GUAM	N	FGN	289	0	366	0	145	0	800	0
GVA	GENEVA, SWITZERLAND	N	FGN	10594	0	10520	1	11863	0	32977	1
GWL	GWALIOR, INDIA	N	FGN	1460	0	1422	1	1460	0	4342	1
GWT	GALWAY, IRELAND	N	FGN	130	0	136	0	8	0	274	0
GXF	SEIYUN, YEMEN	N	FGN	26	0	0	0	0	0	26	0
GXG	NEGAGE, ANGOLA	S	FGN	382	0	314	0	0	0	696	0
GYE	GUAYAQUIL, ECUADOR	S	FGN	1609	0	0	0	0	0	1609	0
GYN	GOIANIA, BRAZIL	S	FGN	7891	0	8638	0	10582	0	27111	0
HAC	HACHijo, JIMA ISLAND, JAPAN	N	FGN	834	1	1396	0	842	0	3072	1
HAH	MORONI-HAHAYA, COMOROS	S	FGN	266	0	343	0	222	0	831	0
HAJ	HANOVER, FED REP OF GERMANY	N	FGN	8844	0	9804	1	8722	0	27370	1
HAK	HAIKOU, P. R. CHINA	N	FGN	770	0	1508	0	1270	0	3548	0
HAM	HAMBURG, FRG	N	FGN	25535	2	27695	3	27741	4	80971	9
HAN	HANOI, SOC REP OF VIETNAM	N	FGN	152	0	158	0	242	0	552	0
HAS	HAIL, SAUDI ARABIA	N	FGN	3642	0	2720	0	2568	0	8930	0
HBA	HOBART, TASMANIA, AUSTRALIA	S	FGN	3785	0	4822	0	5322	0	13929	0
HBT	HAFR ALBAPIN, SAUDI ARABIA	N	FGN	140	0	228	0	208	0	576	0
HDN	STEAMBOAT SPRINGS, CO, USA	N	YES	0	0	0	0	88	0	88	0
HDY	HAT YAI, THAILAND	N	FGN	3094	0	2434	0	2706	0	8234	0
HEL	HELSINKI, FINLAND	N	FGN	2797	0	3382	0	4373	0	10552	0
HER	HERAKLION, GREECE	N	FGN	1780	0	2406	0	2312	0	6498	0
HGH	HANGZHOU, P. R. CHINA	N	FGN	1390	0	1619	0	1610	0	4619	0
HIR	HONIARA, GUADALCANAL, SOLOMON IS.	S	FGN	436	0	648	0	672	0	1756	0
HJR	HIROSHIMA, JAPAN	N	FGN	1460	0	1464	0	1460	0	4384	0
HKD	AKODATE, JAPAN	N	FGN	1030	0	566	0	416	0	2012	0
HKG	HONG KONG, HONG KONG	N	FGN	2792	0	6018	0	7074	0	15884	0
HKT	PHUKET, THAILAND	N	FGN	1932	0	2110	0	2290	0	6332	0
HLN	HELENA, MT, USA	N	YES	2046	0	2188	0	1800	0	6034	0
HLZ	HAMILTON, NEW ZEALAND	S	FGN	627	0	727	0	1151	0	2505	0
HME	HASSI MESSAOUD, ALGERIA	N	FGN	256	0	118	0	268	0	642	0
HND	TOKYO-HANEDA, JAPAN	N	FGN	14398	0	12095	0	9997	1	36490	1
HNL	HONOLULU, OAHU, HI, USA	N	NO	51139	0	51563	0	58525	0	161227	0
HNM	HANA, MAUI, HI, USA	N	NO	0	0	0	0	0	1	0	0
HOD	HODEIDAH, YEMEN	N	FGN	86	0	0	0	0	0	86	0
HOF	HOFUF, SAUDI ARABIA	N	FGN	992	0	960	0	854	0	2806	0
HOR	HORTA FAIAL ISLAND, PORTUGAL	N	FGN	92	0	144	0	188	0	424	0
HOU	HOUSTON, TX, USA	N	YES	71429	3	81688	4	86754	2	239871	9
HPN	WHITE PLAINS, NY, USA	N	YES	2159	0	2049	0	1990	0	6198	0
HRB	HARBIN, MANCHURIA, P. R. CHINA	N	FGN	210	0	147	0	204	0	561	0
HRE	HARARE, ZIMBABWE	S	FGN	3314	0	5238	0	5347	0	13899	0
HRG	HORGHADA, ARAB REP OF EGYPT	N	FGN	760	0	732	0	1024	0	2516	0
HRL	HARLINGEN, TX, USA	N	YES	7446	1	7653	0	7583	0	22682	1
HSV	HUNTSVILLE/DECATUR, AL, USA	N	YES	1817	0	1972	0	3316	0	7105	0
HTI	HAMILTON ISLAND, QLD, AUSTRALIA	S	FGN	1351	0	1648	0	1748	0	4747	0
HTS	HUNTINGTON, WV, USA	N	YES	1152	0	1174	0	538	0	2864	0
HUN	HUALIEN, TAIWAN	N	FGN	6508	0	7264	0	8030	0	21802	0
HYD	HYDERABAD, INDIA	N	FGN	2103	1	2214	5	2265	1	6582	7
IAD	DULLES INT'L, WASHINGTON, DC, USA	N	YES	84839	1	52922	1	50660	0	188421	2
IAH	HOUSTON INTERCONT, TX, USA	N	YES	35485	0	46187	1	42713	0	124385	1
IAM	IN AMENAS, ALGERIA	N	FGN	408	0	420	0	506	0	1334	0
IBA	IBADAN, NIGERIA	N	FGN	1382	0	706	0	484	0	2572	0
IBZ	IBIZA, SPAIN	N	FGN	124	1	220	0	294	1	638	2
ICT	WICHITA, KS, USA	N	YES	10698	0	6225	0	6858	0	23781	0
IDA	IDAHO FALLS, ID, USA	N	YES	2190	0	2756	0	2714	0	7660	0
IDR	INDORE, INDIA	N	FGN	1460	0	1426	0	1460	0	4346	0
IEV	KIEV, USSR	N	FGN	0	0	32	0	8	0	40	0
IFN	ISFAHAN, IRAN	N	FGN	2256	0	2874	0	2728	0	7858	0
IGL	IZMIR-CIGLI, TURKEY	N	FGN	26	0	22	0	0	0	48	0
IGR	IGUAZU, ARGENTINA	S	FGN	986	0	784	0	522	0	2292	0
IGU	IGUASSU FALLS, BRAZIL	S	FGN	1776	0	2764	0	3510	0	8050	0
ILG	PHILADELPHIA-WILMINGTON, PA, USA	N	YES	440	0	0	0	0	0	440	0
ILM	WILMINGTON, NC, USA	N	YES	6254	0	5363	0	4298	0	15915	0
ILR	ILORIN, NIGERIA	N	FGN	1568	0	1884	0	737	0	4189	0
IMF	IMPHAL, INDIA	N	FGN	1460	0	1464	0	1460	0	4384	0
IMP	IMPERATRIZ, BRAZIL	S	FGN	1186	0	1464	0	1456	0	4106	0
IND	INDIANAPOLIS, IN, USA	N	YES	12290	0	19730	0	25796	0	57816	0
INI	NIS, YUGOSLAVIA	N	FGN	57	0	0	0	106	0	163	0
INU	NAURU, REP OF NAURU	S	FGN	889	0	906	1	430	0	2225	1
INZ	IN SALAH, ALGERIA	N	FGN	586	0	504	0	606	0	1696	0
IOA	IOANNINA, GREECE	N	FGN	1354	0	1200	0	1200	0	3754	0
IOS	ILHEUS, BRAZIL	S	FGN	2920	0	2928	0	2954	0	8802	0

AIRPORT APTDEF		HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
IQQ	IQUIQUE, CHILE	S	FGN	1460	0	1674	0	1868	0	5002	0
IQT	IQUITOS, PERU	S	FGN	210	0	304	0	844	0	1358	0
IRJ	LA RIOJA, ARGENTINA	S	FGN	860	0	768	0	736	0	2364	0
IRP	ISIRO, ZAIRE	N	FGN	104	0	156	0	210	0	470	0
ISA	MOUNT ISA, QLD, AUSTRALIA	S	FGN	546	0	1262	1	1660	0	3468	1
ISB	ISLAMABAD RAWALPINDI, PAKISTAN	N	FGN	3663	0	4673	0	4868	0	13204	0
ISG	ISHIGAKI, JAPAN	N	FGN	6936	1	7473	4	6358	0	20767	5
ISO	KINSTON, NC, USA	N	YES	2024	0	1464	0	495	0	3983	0
ISP	LONG ISLAND MACARTHUR, NY, USA	N	YES	5816	0	3036	0	3539	1	12391	1
IST	ISTANBUL, TURKEY	N	FGN	2551	0	2343	0	3213	0	8107	0
ITH	ITHICA, NY, USA	N	YES	182	0	2	0	151	0	335	0
ITO	HILO HAWAII, HI, USA	N	NO	8568	1	9273	2	9946	0	27787	3
IUE	NIUE ISLAND, NIUE	S	FGN	127	0	72	0	26	0	225	0
IVC	INVERCARGILL, NEW ZEALAND	S	FGN	2069	0	2076	1	2096	0	6241	1
IXA	AGARTALA, INDIA	N	FGN	1976	0	2720	0	2593	0	7289	0
IXB	BAGDOGRA, INDIA	N	FGN	2366	1	2196	0	2190	0	6752	1
IXC	CHANDIGARH, INDIA	N	FGN	1460	0	1464	1	1426	1	4350	2
IXD	ALLAHABAD, INDIA	N	FGN	392	0	500	0	1042	0	1934	0
IXE	MANGALORE, INDIA	N	FGN	2370	0	2168	1	1878	0	6416	1
IXJ	JAMMU, INDIA	N	FGN	1650	0	1576	1	1546	1	4772	2
IXL	LEH, INDIA	N	FGN	574	0	916	0	938	0	2428	0
IXM	MADURAI, INDIA	N	FGN	1200	0	1142	0	1344	0	3686	0
IXR	RANCHI, INDIA	N	FGN	1460	0	1464	1	1460	0	4384	1
IXS	SILOHAR, INDIA	N	FGN	1748	0	1832	0	1772	0	5352	0
IXU	AURANGABAD, INDIA	N	FGN	1820	0	1464	1	1460	0	4744	1
IXV	ALONG, INDIA	N	FGN	0	0	0	1	0	0	0	1
IXZ	PORTE BLAIR ANDAMAN ISLAND, INDIA	N	FGN	706	0	928	0	994	0	2628	0
JAC	JACKSON, WY, USA	N	YES	2325	0	2179	0	2342	0	6846	0
JAI	JAIPUR, INDIA	N	FGN	4068	2	4876	2	3736	0	12680	4
JAN	JACKSON, MS, USA	N	YES	3392	0	3085	0	2959	0	9436	0
JAX	JACKSONVILLE, FL, USA	N	YES	10211	0	13077	0	15262	1	38530	1
JDH	JOHHPUR, INDIA	N	FGN	2920	0	2928	0	2816	1	8664	1
JDO	JUAZEIRO DO NORTE CEARAH, BRAZIL	S	FGN	626	0	628	0	624	0	1878	0
JED	JEDDAH, SAUDI ARABIA	N	FGN	19745	0	20292	0	19897	0	59934	0
JER	JERSEY CHANNEL ISLANDS, UK	N	FGN	1263	0	1112	0	3011	0	5386	0
JFK	KENNEDY, NEW YORK, NY, USA	N	YES	13217	0	8785	0	8874	0	30876	0
JGA	JAMNAGAR, INDIA	N	FGN	730	0	732	0	730	0	2192	0
JHB	JOHOR BAHRU, MALAYSIA	N	FGN	4018	0	4164	0	4690	0	12872	0
JIB	DJIBOUTI, DJIBOUTI	N	FGN	508	0	686	0	868	0	2062	0
JKH	CHIOS, GREECE	N	FGN	1858	0	1720	0	1768	0	5346	0
JNB	JOHANNESBURG, SOUTH AFRICA	S	FGN	13746	2	15620	0	18693	1	48059	3
JNU	JUNEAU, AK, USA	N	NO	2255	0	2684	0	2686	0	7625	0
JOI	JOINVILLE, BRAZIL	S	FGN	626	0	628	0	624	0	1878	0
JOS	JOS, NIGERIA	N	FGN	2596	0	2022	0	1643	0	6261	0
JPA	JOAO PESSOA, BRAZIL	S	FGN	1460	0	1832	0	4074	0	7366	0
JRH	JORMAT, INDIA	N	FGN	694	2	732	0	730	0	2156	2
JRO	KILIMANJARO, TANZANIA	S	FGN	1667	0	1568	0	1405	0	4640	0
JSI	SKIATHOS, GREECE	N	FGN	412	0	342	0	448	0	1202	0
JTR	SANTORINI, THIRA ISLAND, GREECE	N	FGN	1126	0	884	0	1480	0	3490	0
JUB	JUBA, SUDAN	N	FGN	38	0	0	0	0	0	38	0
JUJ	JUJUY, ARGENTINA	S	FGN	600	0	226	0	26	0	852	0
KAD	KADUNA, NIGERIA	N	FGN	3896	0	3639	0	2650	0	10185	0
KAN	KANO, NIGERIA	N	FGN	700	0	708	0	765	0	2173	0
KBL	KABUL, AFGHANISTAN	N	FGN	208	0	208	0	78	0	494	0
KBR	KOTA BHARU, MALAYSIA	N	FGN	3024	0	3034	0	3091	0	9149	0
KCH	KUCHING, SARAWAK, MALAYSIA	N	FGN	5337	1	5482	0	6265	0	17084	1
KCZ	KOCHI, JAPAN	N	FGN	1522	0	816	0	170	0	2508	0
KDU	SKARDU, PAKISTAN	N	FGN	190	0	688	0	730	0	1608	0
KEF	REYKJAVIK-KEFLAVIK, ICELAND	N	FGN	561	0	936	0	992	1	2489	1
KER	KERMAN, IRAN	N	FGN	532	0	52	0	0	0	584	0
KGA	KANANGA, ZAIRE	S	FGN	420	0	366	0	490	0	1276	0
KGL	KIGALI, RWANDA	S	FGN	22	0	22	0	208	0	252	0
KGS	KOS, GREECE	N	FGN	550	1	566	0	894	0	2010	1
KHH	KAOHSIUNG, TAIWAN	N	FGN	14596	2	18764	0	20170	0	53530	2
KHI	KARACHI, PAKISTAN	N	FGN	7384	2	9030	0	8710	1	25124	3
KHN	NANCHANG KIANGSI, P. R. CHINA	N	FGN	228	0	190	0	52	0	470	0
KIJ	NIIGATA, JAPAN	N	FGN	2190	0	2224	0	2162	0	6576	0
KIM	KIMBERLEY, SOUTH AFRICA	S	FGN	3888	0	4182	0	4789	3	12859	3
KIW	KINGSTON, JAMAICA	N	FGN	338	0	88	0	208	0	634	0
KKC	KHON KAEN, THAILAND	N	FGN	2264	0	1942	0	1668	0	5874	0
KLX	KALAMATA, GREECE	N	FGN	782	0	742	0	730	0	2254	0
KMG	KUNMING, P.R. CHINA	N	FGN	2448	1	2577	0	3683	0	8708	1
KMI	MIYAZAKI, JAPAN	N	FGN	4686	0	3536	0	3476	0	11696	0
KMJ	KUMAMOTO, JAPAN	N	FGN	0	0	74	0	42	0	116	0
KMP	KEETMANSHOOP, NAMIBIA	S	FGN	174	0	0	0	0	0	174	0

AIRPORT APTDEF		HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
KHQ	KOMATSU, JAPAN	N	FGN	730	0	828	0	702	0	2260	0
KMX	KHAMIS MUSHAIT, SAUDI ARABIA	N	FGN	0	0	0	0	322	0	322	0
KND	KINDU, ZAIRE	S	FGN	480	0	622	0	522	0	1624	0
KNN	KANKAN, GUINEA	N	FGN	0	0	100	0	92	0	192	0
KNU	KANPUR, INDIA	N	FGN	1372	0	1578	0	1068	0	4018	0
KOA	KONA, HI, USA	N	NO	11308	0	11047	1	13819	0	36174	1
KOJ	KAGOSHIMA, JAPAN	N	FGN	843	0	1913	2	1095	0	3851	2
KRN	KIRUNA, SWEDEN	N	FGN	0	0	18	0	0	0	18	0
KRP	KARUP, DENMARK	N	FGN	0	0	0	0	72	0	72	0
KRS	KRISTIANSAND, NORWAY	N	FGN	7646	0	7990	0	7912	0	23548	0
KRT	KHARTOUM, SUDAN	N	FGN	1921	0	2623	1	1945	0	6489	1
KSA	KOSRAE, CAROLINE ISLANDS	N	FGN	10	0	132	0	104	0	246	0
KSD	KARLSTAD, SWEDEN	N	FGN	0	0	0	0	52	0	52	0
KSH	BAKHTARAN, IRAN	N	FGN	0	0	0	0	144	0	144	0
KSM	ST MARY'S, AS, USA	N	NO	420	0	562	0	722	0	1704	0
KST	KOSTI, SUDAN	N	FGN	0	1	0	0	0	0	0	1
KSU	KRISTIANSUND, NORWAY	N	FGN	2128	0	2024	0	2106	0	6258	0
KTM	KATHMANDU, NEPAL	N	FGN	2240	0	2200	1	2195	0	6635	1
KTN	KETCHIKAN, AS, USA	N	NO	1460	0	1464	0	1460	0	4384	0
KUA	KUANTAN, MALAYSIA	N	FGN	426	0	420	0	676	0	1522	0
KUH	KUSHIRO, JAPAN	N	FGN	1336	0	926	0	552	0	2814	0
KUL	KUALA LUMPUR, MALAYSIA	N	FGN	21147	1	22237	0	24379	0	67763	1
KVA	KAVALA, GREECE	N	FGN	1242	0	1160	0	1202	0	3604	0
KWE	GUIYANG, P. R. CHINA	N	FGN	684	0	660	0	834	0	2178	0
KWI	KUWAIT, KUWAIT	N	FGN	3659	0	2728	0	2536	0	8923	0
KWJ	KWANGJU, REP OF KOREA	N	FGN	0	0	0	0	668	0	668	0
KWL	GUILIN, P. R. CHINA	N	FGN	3855	0	4671	0	3365	0	11891	0
LAD	LUANDA, ANGOLA	S	FGN	5680	0	5112	0	3986	0	14778	0
LAN	LANSING, MI, USA	N	YES	1120	0	1646	0	1764	0	4530	0
LAS	LAS VEGAS, NV, USA	N	YES	82033	0	89149	1	96139	0	267321	1
LAX	LOS ANGELES, CA, USA	N	YES	113329	0	123390	2	118819	4	355538	6
LBB	LUBBOCK, TX, USA	N	YES	13600	0	16396	0	16240	0	46236	0
LBU	LABUAN SABAH, MALAYSIA	N	FGN	2398	0	2406	0	2709	0	7513	0
LBV	LIBREVILLE, GABON	N	FGN	1553	0	1955	0	1983	0	5491	0
LCA	LARNACA, CYPRUS	N	FGN	1352	0	1277	0	1616	1	4245	1
LCE	LA CEIBA, HONDURAS	N	FGN	380	0	570	0	1210	0	2160	0
LDB	LONDRINA, BRAZIL	S	FGN	0	0	440	0	1185	0	1625	0
LDE	LOURDES/TARBES, FRANCE	N	FGN	8	1	0	1	0	1	8	3
LDI	LINDI, TANZANIA	S	FGN	10	0	0	0	0	0	10	0
LED	LENINGRAD, U.S.S.R.	N	FGN	198	0	163	0	239	0	600	0
LEI	ALMERIA, SPAIN	N	FGN	100	0	104	0	130	0	334	0
LEJ	LEIPZIG, GDR	N	FGN	16	0	28	0	46	0	90	0
LEX	LEXINGTON, KY, USA	N	YES	3916	1	4165	0	3573	0	11654	1
LFT	LAFAYETTE, LA, USA	N	YES	0	0	0	0	302	0	302	0
LFW	LOME, TOGO	N	FGN	985	0	812	0	929	0	2726	0
LGA	NEW YORK LA GUARDIA, NY, USA	N	YES	32068	1	32703	1	36226	1	100997	3
LGB	LONG BEACH, CA, USA	N	YES	1299	0	3321	0	7605	0	12225	0
LGG	LIEGE, BELGIUM	N	FGN	0	0	0	0	0	1	0	1
LGK	LANGKAWI, MALAYSIA	N	FGN	0	0	206	0	448	0	654	0
LGW	LONDON-GATWICK, ENGLAND	N	FGN	13117	0	17634	1	36365	2	67116	3
LHE	LAHORE, PAKISTAN	N	FGN	7188	1	9191	2	9169	0	25548	3
LHR	LONDON HEATHROW, ENGLAND, (UK)	N	FGN	69405	2	75934	1	93470	2	238809	5
LHW	LANZHOU, P. R. CHINA	NN	FGN	0	0	83	0	21	0	104	0
LIH	LIHUE, KAUAI, HI, USA	NN	NO	17365	2	17708	3	19247	3	54320	8
LIL	LILLE, FRANCE	NN	FGN	214	0	292	0	367	0	873	0
LIM	LIMA, PERU	S	FGN	1460	0	2157	0	2318	0	5935	0
LIN	MILAN LINATE, ITALY	N	FGN	7588	1	7604	1	7641	0	22833	2
LIS	LISBON, PORTUGAL	NN	FGN	10558	0	13190	0	14480	0	38228	0
LIT	LITTLE ROCK, AK, USA	NN	YES	10791	1	10853	1	9382	1	31026	3
LJA	LODJA, ZAIRE	S	FGN	106	0	104	0	74	0	284	0
LJU	LJUBLJANA, YUGOSLAVIA	NN	FGN	1741	0	1704	1	1615	0	5060	1
LKO	LUCKNOW, INDIA	NN	FGN	4396	1	4264	1	4236	2	12896	4
LLA	LULEA, SWEDEN	NN	FGN	0	0	8	0	0	0	8	0
LLW	LILONGWE, MALAWI	S	FGN	752	1	786	0	823	0	2361	1
LMT	KLAMATH FALLS, OR, USA	N	YES	1218	0	62	0	0	0	1280	0
LNK	LINCOLN, NB, USA	N	YES	5816	0	5847	0	4201	0	15864	0
LNZ	LONZ, AUSTRIA	N	FGN	768	1	704	0	683	0	2155	1
LOS	LAGOS, NIGERIA	N	FGN	16716	1	14969	1	11299	0	42984	2
LPA	GRAN CANARIA, CANARY ISLANDS	N	FGN	293	0	1439	0	2682	1	4414	1
LPB	LA PAZ, BOLIVIA	S	FGN	136	0	264	0	312	0	712	0
LPL	LIVERPOOL, ENGLAND	N	FGN	30	0	42	0	134	0	206	0
LRH	LA ROCHELLE, FRANCE	N	FGN	0	0	8	0	4	0	12	0
LST	LAUNCESTON, TASMANIA, AUSTRALIA	S	FGN	4721	1	5684	0	5723	2	16128	3
LTN	LONDON-LUTON INT'L, ENGLAND	N	FGN	192	0	270	0	556	1	1018	1
LUN	LUSAKA, ZAMBIA	S	FGN	2302	0	1961	0	2183	0	6446	0

AIRPORT APTDEF		HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	ING5
LUO	LUENA, ANGOLA	S	FGN	434	0	472	0	556	0	1462	0
LUQ	SAN LUIS, ARGENTINA	S	FGN	196	0	0	0	0	0	196	0
LUT	LAURA STATION, AUSTRALIA	S	FGN	0	0	0	0	0	0	0	0
LUX	LUXEMBOURG, LUXEMBOURG	N	FGN	2615	0	3500	0	3753	0	9868	0
LXR	LUXOR, ARAB REP OF EGYPT	N	FGN	2161	0	2143	1	2995	0	7299	1
LXS	LEMNOS, GREECE	N	FGN	1040	0	996	0	1060	1	3096	1
LYH	LYNCHBURG, VA, USA	N	YES	1824	0	2306	0	1754	0	5884	0
LYP	FAISALABAD, PAKISTAN	N	FGN	790	0	1326	0	1324	0	3440	0
LYR	LONGYEARBYEN, NORWAY	N	FGN	14	0	223	0	255	0	492	0
LYS	LYON, FRANCE	N	FGN	5223	0	5439	0	5714	0	16376	0
MAA	MADRAS, INDIA	N	FGN	7714	0	8485	3	8067	1	24266	4
MAB	MARABA, BRAZIL	S	FGN	470	0	628	0	782	0	1880	0
MAD	MADRID, SPAIN	N	FGN	6813	1	7477	0	9134	0	23424	1
MAF	MIDLAND ODessa, TX, USA	N	YES	16021	1	14942	0	14184	2	45147	3
MAH	MAHON, MENORCA, SPAIN	N	FGN	84	0	174	0	310	1	568	1
MAJ	MAJURO, MARSHALL ISLAND	N	FGN	92	0	132	0	104	0	328	0
MAL	MANGOLE, INDONESIA	N	FGN	0	0	0	0	0	0	0	0
MAN	MANCHESTER, ENGLAND (UK)	N	FGN	5780	3	7490	1	10909	0	24179	4
MAO	MANAUS, BRAZIL	S	FGN	6627	0	7820	0	9619	0	24066	0
MBA	MOMBASA, KENYA	S	FGN	0	0	0	0	21	0	21	0
MBJ	MONTEGO BAY, JAMAICA	N	FGN	218	0	0	0	0	0	218	0
MBS	SAGINAW, MI, USA	N	YES	794	0	272	0	2169	0	3235	0
MBX	MARIBOR, YUGOSLAVIA	N	FGN	0	0	0	0	40	0	40	0
MCG	MCGRATH, AS, USA	N	NO	0	0	0	0	204	0	204	0
MCI	KANSIS CITY, MO, USA	N	YES	26453	0	29842	0	50786	0	107081	0
MCO	ORLANDO-INT'L, FL, USA	N	YES	23551	1	28187	0	25069	0	76807	1
MCP	MACAPA, AMAPA, BRAZIL	N	FGN	1888	0	2337	0	2295	0	6520	0
MCT	MUSCAT, OMAN	N	FGN	4409	0	5241	0	5174	0	14824	0
MCY	MAROCCHYDRE, QLD, AUSTRALIA	S	FGN	104	0	136	0	10	0	250	0
MCZ	MACEIO, ALAGOAS, BRAZIL	S	FGN	978	0	1646	0	4088	0	6712	0
MDE	MEDELLIN, COLOMBIA	N	FGN	312	0	312	0	314	0	938	0
MDI	MAKURDI, NIGERIA	N	FGN	730	0	695	0	375	0	1800	0
MDK	MBANDAKA, ZAIRE	N	FGN	416	0	522	0	526	0	1464	0
MDP	MINDIPTANA, INDONESIA	-0-	FGN	0	0	0	0	0	1	0	1
MDQ	MAR DEL PLATA, ARGENTINA	S	FGN	2964	0	2816	2	2662	1	8442	3
MDT	HARRISBURG-OLMSTEAD ST, PA, USA	N	YES	3784	1	3265	0	2805	0	9854	1
MDW	CHICAGO-MIDWAY, IL, USA	N	YES	33077	2	46544	2	49337	1	128958	5
MDZ	MENDOZA, ARGENTINA	S	FGN	1578	0	1106	0	886	0	3570	0
MED	MEDINA, SAUDI ARABIA	N	FGN	4698	0	5236	0	4896	1	14830	1
MEG	MALANGE, ANGOLA	S	FGN	740	0	758	0	696	0	2194	0
MEL	MELBOURNE, VICTORIA, AUSTRALIA	S	FGN	17124	1	21097	3	31383	0	69604	4
MEM	MEMPHIS, TN, USA	N	YES	8599	0	7534	0	7035	0	23168	0
MES	MEDAN, INDONESIA	N	FGN	730	0	732	0	714	0	2176	0
MEX	MEXICO CITY, MEXICO	N	FGN	4170	0	5281	0	5092	0	14543	0
MFE	MC ALLEN, TX, USA	NN	YES	288	0	1148	0	1052	0	2488	0
MFR	MEDFOR, OR, USA	NN	YES	3529	0	2228	1	1784	0	7541	1
MFU	MFUWE, ZAMBIA	S	FGN	34	0	60	0	30	0	124	0
MGA	MANAGUA, NICARAGUA	NN	FGN	3212	0	2689	0	1762	1	7663	1
MGM	MONTGOMERY, AL, USA	N	YES	148	0	896	0	1681	0	2725	0
MGO	MOGADISHU, SOMALIA	N	FGN	94	0	46	0	50	0	190	0
MHD	MASHAD, IRAN	N	FGN	516	0	0	0	0	0	516	0
MHT	MANCHESTER, NH, USA	N	YES	0	0	1106	0	2733	0	3839	0
MAI	MIAMI, FL, USA	N	YES	28033	0	34912	1	29373	0	92318	0
MID	MERIDA, MEXICO	N	FGN	0	0	244	0	170	0	414	0
MIL	MILAN, ITALY	N	FGN	0	1	0	0	0	0	0	1
MIR	MONASTIR, TUNISIA	N	FGN	488	0	336	0	567	0	1391	0
MIU	MAIDUGURI, NIGERIA	N	FGN	887	0	1042	0	636	0	2565	0
MJM	MBUJI-MAYI, ZAIRE	S	FGN	364	0	510	0	618	0	1492	0
MJN	MAJUNGA, MADAGASCAR	S	FGN	402	0	336	0	298	0	1036	0
MJT	MYTILENE, GREECE	N	FGN	2852	0	2634	0	2820	0	8306	0
MKE	MILWAUKEE, WI, USA	NN	YES	1056	0	3124	0	4861	0	9041	0
MKY	HALACCA, MALAYSIA	S	FGN	2109	0	2272	0	1316	0	5697	0
MLA	MALTA, MEDITERRANEAN SEA	NN	FGN	2882	0	4492	0	5117	1	12491	1
MLB	MELBOURNE, FL, USA	NN	YES	958	0	1674	0	1034	0	3666	0
MLE	MALE, MALDIVES	NN	FGN	356	0	664	0	454	0	1274	0
MLH	MULHOUSE/BASEL, FRANCE	NN	FGN	1	0	4	0	21	0	26	0
MLI	MOLINE, IL, USA	NN	YES	1947	0	2284	0	2941	0	7172	0
MLU	MONROE, LA, USA	NN	YES	3670	0	3712	0	2852	0	10234	0
MLW	MONROVIA, LIBERIA	NN	FGN	0	0	0	0	124	0	124	0
MMY	MIYAKO JIMA, JAPAN	N	FGN	3606	5	4836	5	3834	0	12276	10
MNL	MANILA, PHILIPPINES	N	FGN	1232	0	1211	0	1321	0	3764	0
MOB	MOBILE AL/PASCAGOULA, MS, USA	N	YES	3013	0	2274	0	330	0	5617	0
MOC	MONTES CLAROS, BRAZIL	S	FGN	416	0	420	0	416	0	1252	0
MOL	MOLDE, NORWAY	N	FGN	2129	0	2263	0	2366	0	6758	0
MOQ	MORONDAVA, MADAGASCAR	S	FGN	112	0	204	0	150	0	466	0

AIRPORT APTDEF

HEMISPHR CONUS STGFY87 ING1 STGFY88 ING2 STGFY89 ING3 STG737 INGS

MOT	MINOT, ND, USA	N	YES	737	0	964	0	648	0	2349	0
MPL	MONTPELLIER, FRANCE	N	FGN	52	0	52	0	52	0	156	0
MPM	MAPUTO, MOZAMBIQUE	S	FGN	2248	0	2289	0	1480	0	6017	0
MRS	MARSEILLE, FRANCE	N	FGN	3381	0	3805	0	4186	0	11372	0
MRU	MAURITIUS, MAURITIUS	S	FGN	321	0	437	0	446	0	1204	0
MRY	MONTEREY, CA, USA	N	YES	3559	0	1923	0	1844	0	7326	0
MSN	MADISON, WI, USA	N	YES	1695	0	1489	0	2132	0	5316	0
MZO	MISSOULA, MT, USA	N	YES	3537	1	3427	0	3307	0	10271	1
MSP	MINNEAPOLIS-ST PAUL, MN, USA	N	YES	8120	1	11799	0	16476	0	36395	1
MSR	MUENSTER, FRG	N	FGN	4	0	0	0	0	0	4	0
MSY	NEW ORLEANS, LA, USA	N	YES	25950	0	32656	1	32966	3	91572	4
MSZ	NAMIBE, ANGOLA	S	FGN	228	0	262	0	138	0	628	0
MTS	MANZINI, SWAZILAND	S	FGN	96	0	192	0	154	0	442	0
MTY	MONTERREY, MEXICO	N	FGN	0	0	62	0	48	0	110	0
MUC	MUNICH, FRG	N	FGN	36435	4	44305	1	46990	1	127730	6
MUX	MULTAN, PAKISTAN	N	FGN	2488	0	2344	0	2303	0	7135	0
MUZ	MUSOMA, TANZANIA	S	FGN	8	0	0	0	0	0	8	0
MVB	FRANCEVILLE, GABON	N	FGN	1	0	5	0	3	0	9	0
MVD	MONTEVIDEO, URUGUAY	S	FGN	4977	0	5351	0	5226	0	15554	0
MVR	MAROUA, REP OF CAMEROON	N	FGN	1190	0	1052	0	933	0	3175	0
MWZ	MWANZA, TANZANIA	S	FGN	79	0	530	0	785	0	1394	0
MXP	MILAN-MALPENSA, ITALY	N	FGN	4	0	21	1	26	0	51	1
MXZ	MEIXIAN, P. R. CHINA	N	FGN	0	0	328	0	420	0	748	0
HYJ	MATSUYAMA, SHIKIKU, JAPAN	N	FGN	290	0	862	0	762	0	1914	0
MYR	MYRTLE BEACH, SC, USA	N	YES	4864	0	5504	0	6440	1	16808	1
MYW	MTWARA, TANZANIA	S	FGN	370	0	312	0	290	0	972	0
MYY	MIRI, SARAWAK, MALAYSIA	N	FGN	3024	0	3244	0	3730	0	9998	0
MZG	MAKUNG, TAIWAN	N	FGN	8877	0	10980	0	10180	0	30037	0
MZM	METZ, FRANCE	N	FGN	0	0	0	0	21	0	21	0
MZT	MAZATLAN, MEXICO	N	FGN	976	0	554	0	628	0	2158	0
NAG	NAGPUR, INDIA	N	FGN	2756	0	2440	0	1970	0	7166	0
NAK	NAKHON RATCHASIMA, THAILAND	N	FGN	0	0	0	0	82	0	82	0
NAN	NADI, FIJI	S	FGN	1373	0	1413	0	1724	0	4510	0
NAP	NAPLES, ITALY	N	FGN	739	0	584	0	662	0	1985	0
NAS	NASSAU, BAHAMAS	N	FGN	7440	0	9851	0	10501	0	27792	0
NAT	NATAL, BRAZIL	S	FGN	4380	0	4976	0	5422	0	14778	0
NBO	NAIROBI, KENYA	S	FGN	1051	0	1087	0	1344	0	3482	0
NCE	NICE, FRANCE	N	FGN	3675	1	5258	0	5599	0	14532	1
NCL	NEWCASTLE, ENGLAND	N	FGN	1825	0	1589	1	1879	0	5293	1
NDD	SUMBE, ANGOLA	S	FGN	10	0	0	0	0	0	10	0
NDJ	N'DJAMENA, CHAD	N	FGN	18	0	0	0	20	0	38	0
NGE	N'GAOUNDERE, REP OF CAMEROON	N	FGN	1006	0	902	0	870	0	2778	0
NGO	NAGOYA, JAPAN	N	FGN	5577	0	6995	1	6550	0	19122	1
NIM	NIAMEY, NIGER	N	FGN	62	0	0	0	0	0	62	0
NKC	NOUAKCHOTT, MAURITANIA	N	FGN	110	0	82	0	66	0	258	0
NKG	NANJING, P. R. CHINA	N	FGN	2476	0	2744	0	3005	0	8225	0
NLA	NDOLA, ZAMBIA	S	FGN	701	0	508	0	730	0	1939	0
NLK	NORFOLK ISLAND, PACIFIC OCEAN	S	FGN	420	0	581	0	628	0	1629	0
NNG	NANNING, P. R. CHINA	N	FGN	1157	0	1042	0	480	0	2679	0
NOS	NOSSIBE, MADAGASCAR	S	FGN	508	0	614	0	700	0	1822	0
NOU	NOUMEA, NEW CALEDONIA	S	FGN	219	0	209	0	949	0	1377	0
NOV	HUAMBO, ANGOLA	S	FGN	520	0	630	0	1254	0	2404	0
NPE	APIER, NEW ZEALAND	S	FGN	0	0	0	0	80	0	80	0
NON	NEUQUEN, ARGENTINA	S	FGN	1876	0	1838	0	1598	0	5312	0
NRT	TOKYO-NARITA, JAPAN	N	FGN	0	0	640	0	730	0	1370	0
NUE	NUREMBURG, FRG	N	FGN	3516	1	4068	1	3943	1	11527	3
NVT	NAVANTES, BRAZIL	S	FGN	2608	0	2556	0	2500	0	7664	0
OAJ	JACKSONVILLE, NC, USA	N	YES	2428	0	1892	0	1588	0	5908	0
OAK	OAKLAND, SAN FRANCISCO, CA, USA	N	YES	27453	3	25240	0	24777	0	77470	3
ODE	ODENSE, DENMARK	N	FGN	567	0	496	0	503	0	1566	0
OGG	KAHULUI, MAUI, HI, USA	N	NO	27942	1	27757	1	29505	0	85204	2
OGN	YONAGUNI-JIMA, JAPAN	N	FGN	0	0	30	0	0	0	30	0
OGX	OURAGLA, ALGERIA	N	FGN	836	0	552	0	841	0	2229	0
OHD	OHRID, YUGOSLAVIA	N	FGN	292	0	523	0	452	0	1267	0
OIT	OITA, JAPAN	N	FGN	854	0	818	0	1472	1	3144	1
OKA	OKINAWA, RYUKYU IS, JAPAN	N	FGN	11818	0	13972	0	13660	0	39450	0
OKC	OKLAHOMA CITY, OK, USA	N	YES	25165	0	27072	1	26161	1	78398	2
OKJ	OKAJAMA, JAPAN	N	FGN	0	0	923	0	1444	0	2367	0
OLB	OLBIA, ITALY	N	FGN	40	0	42	0	92	0	174	0
OMA	OMAHA, NB, USA	N	YES	10800	0	10871	0	13689	0	35360	0
OME	NOME, AK, USA	N	NO	2272	0	2232	0	2269	0	6773	0
OMO	MOSTAR, YUGOSLAVIA	N	FGN	0	0	0	0	178	0	178	0
ONT	ONTARIO, CA, USA	N	YES	33033	0	34539	0	35608	0	103180	0
OOL	GOLD COAST, QLD, AUSTRALIA	S	FGN	2812	0	3663	0	5208	0	11683	0
OPO	OPORTO, PORTUGAL	N	FGN	3349	1	3331	0	5553	0	12233	1

AIRPORT APTDEF		HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	ING5
ORD	CHICAGO-O'HARE, IL, USA	N	YES	59542	2	79401	3	110094	1	249037	6
ORF	NORFOLK-VA. BEACH, VA, USA	N	YES	24618	2	20845	0	19290	3	64753	5
ORH	WORCESTER, MA, USA	N	YES	719	0	2976	0	1966	0	5661	0
ORK	CORK, IRELAND	N	FGN	2942	0	3322	0	4963	0	11227	0
ORN	ORAN, ALGERIA	N	FGN	4524	0	4495	0	4450	0	13469	0
ORY	PARIS - ORLY ARPT, FRANCE	N	FGN	6960	1	8806	1	9381	2	25127	4
OSA	OSAKA, JAPAN	N	FGN	1792	0	1262	0	1246	0	4300	0
OSD	OSTERSUND, SWEDEN	N	FGN	0	0	0	0	6	0	6	0
OSL	OSLO, NORWAY	N	FGN	14168	0	0	0	0	0	14168	0
OSM	MOSUL, IRAQ	N	FGN	312	0	314	0	314	0	940	0
OTP	BUCHAREST-OTOPENI, ROMANIA	N	FGN	487	0	405	0	481	0	1373	0
OTZ	KOTZEBUE, AS, USA	N	NO	2082	0	2050	0	2082	0	6214	0
OUA	OUAGADOUGOU, BURKINA FASO	N	FGN	14	0	0	0	0	0	14	0
OUD	OUJDA, MOROCCO	N	FGN	402	0	386	0	361	0	1149	0
QUE	QUESSO, PEOP REP OF CONGO	N	FGN	258	0	260	0	222	0	740	0
OZZ	OUARAZATE, MOROCCO	N	FGN	161	0	395	0	385	0	941	0
PAP	PORT AU PRINCE, HAITI	N	FGN	0	0	88	0	208	0	296	0
PAT	PATNA, INDIA	N	FGN	4973	2	4408	3	3842	0	13223	5
PBI	WEST PALM BEACH, FL, USA	N	YES	10310	0	9469	0	9081	0	28860	0
PBM	PARAMARIBO, REP OF SURINAME	N	FGN	104	0	106	0	104	0	314	0
PCL	PUCALLPA, PERU	S	FGN	586	0	110	0	182	0	878	0
PDB	PEDRO BAY, AS, USA	N	NO	0	0	0	0	0	1	0	1
PDL	PONTA DELGADA, PORTUGAL (AZORES)	N	FGN	886	0	933	0	451	0	2270	0
PPD	PUNTA DEL ESTE, URUGUAY	S	FGN	2332	0	1676	0	1863	0	5871	0
PDX	PORTLAND, OR, USA	N	YES	18968	3	17604	0	18875	1	55447	4
PEK	BEIJIN, P. R. CHINA	N	FGN	9169	2	9152	0	8951	0	27272	2
PEM	PUERTO Maldonado, PERU	S	FGN	0	0	92	0	64	0	156	0
PEN	PENANG, MALAYSIA	N	FGN	9062	2	9591	0	10330	0	28983	2
PER	PERTH, WA, AUSTRALIA	S	FGN	1178	0	1503	0	3664	0	6345	0
PEW	PESHAWAR, PAKISTAN	NN	FGN	418	0	440	0	578	0	1436	0
PHC	PORT HARCOURT, NIGERIA	N	FGN	208	0	707	0	821	0	1736	0
PHE	PORT HEDLAND, WA, AUSTRALIA	S	FGN	130	0	0	0	0	0	130	0
PHL	PHILADELPHIA/WILMINGTON, PA, USA	N	YES	34184	0	45759	2	45635	2	125578	4
PHS	PHITSANULOK, THAILAND	N	FGN	1460	0	1464	0	818	0	3742	0
PHX	PHOENIX, AZ, USA	N	YES	163588	0	177325	0	199769	1	540682	1
PIA	PEORIA, IL, USA	N	YES	389	0	603	0	993	0	1985	0
PIE	TAMPA-ST PETERSBURG, FL, USA	N	YES	302	3	0	0	343	1	645	4
PIK	GLASGOW-PRESWICK, SCOTLAND	NN	FGN	52	0	104	0	97	0	253	0
PIT	PITTSBURGH, PA, USA	N	YES	69413	0	80005	0	65047	0	214465	0
PIU	PIURA, PERU	S	FGN	1068	0	62	0	338	0	1468	0
PLZ	PORT ELIZABETH, SOUTH AFRICA	S	FGN	12531	1	14399	2	13797	3	40727	6
PMA	PEMBA ISLAND, TANZANIA	SS	FGN	8	0	0	0	0	0	8	0
PMC	PUERTO MONTT, CHILE	SS	FGN	1400	0	1565	0	1861	0	4826	0
PME	PORTSMOUTH, UK	NN	FGN	0	0	0	2	0	0	0	2
PMI	PALMA MALLORCA ISLAND, SPAIN	N	FGN	2449	0	3158	0	6948	1	12555	1
PMO	PALERMO, ITALY	N	FGN	0	0	46	0	246	0	292	0
PMR	PALMERSTON, NEW ZEALAND	S	FGN	2592	2	2752	0	2694	0	8038	2
PNA	PAMPLONA, SPAIN	NN	FGN	0	0	0	0	0	1	0	1
PNQ	POONA, INDIA	N	FGN	842	0	1554	0	1968	0	4364	0
PNR	POINTE NOIRE, PEOP REP OF CONGO	S	FGN	1265	0	912	0	640	0	2817	0
PNS	PENSACOLA, FL, USA	N	YES	2180	0	1824	0	1328	0	5332	0
PNZ	PETROLINA, BRAZIL	S	FGN	720	0	732	0	732	0	2184	0
POA	PORTO ALEGRE, BRAZIL	S	FGN	8156	0	7765	0	5217	0	21138	0
POG	PORT GENTIL, GABON	SS	FGN	18	0	139	0	263	0	420	0
POL	PEMBA, MOZAMBIQUE	S	FGN	260	0	262	0	150	0	672	0
POS	PORT OF SPAIN, TRINIDAD/TOBAGO	N	FGN	52	0	52	0	52	0	156	0
PPG	PAGO PAGO, SAMOA	S	FGN	434	0	147	0	26	0	607	0
PPP	PROSERPINE, QLD, AUSTRALIA	S	FGN	437	0	521	0	257	0	1215	0
PPT	PAPEETE, SOCIETY IS, FR POLYNESIA	S	FGN	0	0	0	0	51	0	51	0
PRG	PRAGUE, CZECHOSLOVAKIA	N	FGN	1231	0	1148	0	1510	0	3889	0
PSA	PISA, ITALY	N	FGN	1082	0	1026	1	458	0	2566	1
PSC	PASCO, WA, USA	NN	YES	864	0	2035	0	2565	0	5464	0
PSG	PETERSBURG, AS, USA	N	NO	1460	0	1464	0	1460	0	4384	0
PSI	PASNI, PAKISTAN	NN	FGN	208	0	208	0	210	0	626	0
PSP	PALM SPRINGS, CA, USA	N	YES	3083	0	3434	0	3653	0	10170	0
PSS	POSADAG, ARGENTINA	S	FGN	938	0	928	0	810	0	2676	0
PTY	PANAMA CITY, PANAMA	N	FGN	2683	0	2922	1	3258	0	8863	1
PUB	PUEBLO, CO, USA	N	YES	2569	0	2395	0	2190	0	7154	0
PUQ	PUNTA ARENAS, CHILE	S	FGN	760	0	782	0	827	0	2369	0
PUS	PUSAN, REP OF KOREA	N	FGN	0	0	0	0	1704	0	1704	0
PUY	PULA, YUGOSLAVIA	N	FGN	76	0	286	0	400	1	762	1
PVD	PROVIDENCE, RI, USA	N	YES	5358	0	7982	0	10925	1	24263	1
PVK	PORTO VELHO, BRAZIL	S	FGN	4700	0	4786	1	4888	1	14374	2
PVK	PREVEZA/LEFKAS, GREECE	N	FGN	0	0	0	0	0	0	0	0
PVR	PUERTO VALLARTA, MEXICO	N	FGN	880	0	888	0	540	0	2308	0

AIRPORT APTDEF		HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	ING5
PLW	PORLAND, ME, USA	N	YES	2450	0	3650	0	6679	0	12779	0
PXO	PORTO SANTO, PORTUGAL (MADEIRA)	N	FGN	58	0	78	0	102	0	238	0
PZO	PUERTO ORDAZ, VENEZUELA	N	FGN	0	0	0	0	74	0	74	0
PZU	PORT SUDAN, SUDAN	N	FGN	925	0	1517	0	1344	0	3786	0
QTV	TREVISIO, ITALY	N	FGN	0	0	0	1	0	0	0	1
RAE	ARAR, SAUDI ARABIA	N	FGN	1662	0	1576	0	1728	0	4966	0
RAH	RAFHA, SAUDI ARABIA	N	FGN	166	0	210	0	240	0	616	0
RAJ	RAJKOT, INDIA	N	FGN	730	0	732	0	692	0	2154	0
RAK	MARRAKECH, MOROCCO	N	FGN	529	0	777	0	1086	0	2392	0
RAP	RAPID CITY, SD, USA	N	YES	4703	1	2847	0	3554	0	11104	1
RAR	RAROTONGA, COOK ISLAND, S. PACIFIC	S	FGN	152	0	63	0	0	0	215	0
RAS	RASHT, IRAN	N	FGN	540	0	40	0	0	0	580	0
RBA	RABAT, MOROCCO	N	FGN	0	0	562	0	531	0	1093	0
RBR	RIO BRANCO, BRAZIL	S	FGN	3614	0	3146	0	3146	0	9906	0
RCU	RIO CUARTO, ARGENTINA	S	FGN	552	0	0	0	0	0	552	0
RDD	REDDING, CA, USA	N	YES	3151	0	737	0	0	0	3888	0
RDU	RALEIGH-DURHAM, NC, USA	N	YES	23607	0	20624	0	16416	0	60647	0
REC	RECIFE, BRAZIL	S	FGN	8974	0	11088	1	15588	0	35650	1
REL	TRELEW, ARGENTINA	S	FGN	2448	0	1928	0	1984	0	6360	0
RES	RESISTENCIA, ARGENTINA	S	FGN	730	0	556	2	752	0	2038	2
RGA	RIO GRANDE, ARGENTINA	S	FGN	1628	0	1278	0	1253	0	4159	0
RGL	RIO GALLEGOS, ARGENTINA	S	FGN	3170	0	2492	0	1838	0	7500	0
RGN	RANGOON, BURMA	N	FGN	0	0	0	0	44	0	44	0
RHO	RHODES, GREECE	N	FGN	728	0	1132	0	2254	0	4114	0
RIC	RICHMOND, VA, USA	N	YES	8252	0	9847	0	9821	0	27920	0
RIJ	RIOJA, PERU	S	FGN	338	0	600	0	192	0	1130	0
RIY	RIYAN, YEMEN	N	FGN	560	0	322	0	242	0	1124	0
RJK	RIJEKA, YUGOSLAVIA	N	FGN	76	0	370	0	378	0	824	0
RKT	RAS AL KHAIMAH, U. A. EMIRATES	N	FGN	236	0	237	0	238	0	711	0
RNN	RONNE, DENMARK	N	FGN	298	0	242	0	272	0	812	0
RNO	RENO, NV, USA	N	YES	25150	1	20535	1	20236	0	65921	2
ROA	ROANOKE, VA, USA	N	YES	3910	1	4468	0	4283	0	12661	1
ROB	MONROVIA ROBERTS, LIBERIA	N	FGN	320	0	210	0	296	0	826	0
ROC	ROCHESTER, NY, USA	N	YES	13533	0	13078	1	17916	1	44527	2
ROK	ROCKHAMPTON, QLD, AUSTRALIA	S	FGN	3570	0	3750	0	2933	0	10253	0
ROR	KOROR, PALAU ISLAND, PACIFIC OCEAN	N	FGN	132	0	39	0	0	0	171	0
ROS	ROSARIO, ARGENTINA	S	FGN	1704	0	1478	0	900	0	4082	0
ROT	ROTORUA, NEW ZEALAND	S	FGN	0	0	292	0	482	0	774	0
RPR	RAIPUR, INDIA	N	FGN	1460	0	830	0	738	0	3028	0
RRS	ROROS, NORWAY	N	FGN	782	0	792	0	790	0	2364	0
RSW	FORT MYERS REGIONAL, FL, USA	N	YES	2486	0	7120	0	6729	0	16335	0
RTB	ROATAN, HONDURAS	N	FGN	0	0	188	0	1482	0	1670	0
RUH	RIYADH, SAUDI ARABIA	N	FGN	21799	0	21703	1	22246	0	65748	1
RUN	REUNION ISLAND, INDIAN OCEAN	S	FGN	436	0	410	0	304	0	1150	0
SAB	SABA, WETH. ANTILLES	N	FGN	0	0	0	1	0	0	0	1
SAH	SANA, YEMEN	N	FGN	1580	0	1379	0	1291	0	4250	0
SAL	SAN SALVADOR, EL SALVADOR	N	FGN	6574	0	7271	0	8073	1	21918	1
SAN	SAN DIEGO, CA, USA	N	YES	36109	0	46848	1	55661	0	138618	1
SAO	SAO PAULO, BRAZIL	S	FGN	0	0	0	1	0	0	0	1
SAP	SAN PEDRO, SULA, HONDURAS	N	FGN	3411	0	4099	0	3944	0	11454	0
SAT	SAN ANTONIO, TX, USA	N	YES	31907	2	36421	1	33551	1	101879	4
SAV	SAVANNAH, GA, USA	N	YES	5077	0	4364	0	6639	1	16080	1
SBA	SANTA BARBARA, CA, USA	N	YES	2895	0	3035	0	3666	0	9596	0
SBN	SOUTH BEND, IN, USA	N	YES	1496	0	1708	0	2294	0	5498	0
SCC	PRUDHOE BAY, DEADHORSE, AS, USA	N	NO	3834	1	3908	0	3878	0	11620	1
SCK	STOCKTON, CA, USA	N	YES	787	0	0	0	0	0	787	0
SCL	SANTIAGO, CHILE	S	FGN	3733	0	5184	0	5928	0	14845	0
SCN	SAARBRUECKEN, FRG	N	FGN	0	0	0	1	8	0	8	1
SCQ	SANTIAGO DE COMPOSTELA, SPAIN	N	FGN	0	0	0	0	348	0	348	0
SOA	BAGHDAD-SADDAM, IRAQ	N	FGN	2599	0	1451	0	1406	0	5456	0
SDD	LUBANGO, ANGOLA	S	FGN	862	0	784	0	694	0	2340	0
SDE	SANTIAGO DEL ESTERO, ARGENTINA	S	FGN	910	0	732	0	690	0	2332	0
SOF	LOUISVILLE, KY, USA	N	YES	11936	1	11837	0	9752	0	33525	1
SDJ	SENDAI, JAPAN	N	FGN	2796	0	3276	1	3527	0	9599	1
SDK	SANDAKAN, SABAH, MALAYSIA	N	FGN	2190	0	2196	0	4340	0	8726	0
SDQ	SANTO DOMINGO, DOMINICAN REP	N	FGN	0	0	124	0	208	0	332	0
SEA	SEATTLE/TACOMA, WA, USA	N	YES	27059	0	29147	0	26176	0	82382	0
SEL	SEOUL, REP OF KOREA	N	FGN	0	0	0	0	2376	0	2376	0
SEZ	MAHE IS. SEYCHELLES IS.	S	FGN	0	0	93	0	57	0	150	0
SFA	SFAX, TUNISIA	N	FGN	186	0	196	0	188	0	568	0
SFN	SANTA FE, ARGENTINA	S	FGN	624	0	784	0	686	1	2094	1
SFO	SAN FRANCISCO-OAKLAND, CA, USA	N	YES	82408	2	78067	4	94302	1	254777	7
SFT	SKELLEFTEA, SWEDEN	N	FGN	0	0	0	0	2	0	2	0
SGF	SPRINGFIELD, MO, USA	N	YES	3704	0	2335	0	2381	0	8420	0
SGN	HO CHI MINH, SOC REP OF VIETNAM	N	FGN	0	0	0	0	88	0	88	0

AIRPORT APTDEF		HEMISPHR CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	ING5	
SHA	SHANGHAI, P. R. CHINA	N	FGN	1678	0	2060	0	2291	0	6029	0
SHE	SHENYANG, P. R. CHINA	N	FGN	208	0	400	0	444	0	1052	0
SHI	SHIMOJISHIMA, JAPAN	N	FGN	0	0	0	1	0	0	0	1
SHJ	SHARJAH, U. A. EMIRATES	N	FGN	2588	0	2845	0	2934	0	8367	0
SHV	SHREVEPORT, LA, USA	N	YES	3098	0	3472	0	2510	0	9080	0
SHW	SHARURAH, SAUDI ARABIA	N	FGN	730	0	730	0	732	0	2192	0
SIA	XI AN, P. R. CHINA	N	FGN	848	0	991	0	1265	0	3104	0
SID	SAL, CAPE VERDE ISLAND	N	FGN	10	0	40	0	0	0	50	0
SIN	SINGAPORE, SINGAPORE	N	FGN	6631	0	6354	0	6479	0	19464	0
SIT	SITKA, AK, USA	N	NO	778	0	782	0	778	0	2338	0
SJC	SAN JOSE, CA, USA	N	YES	37310	2	37278	0	37768	2	112356	4
SJD	LOS CABOS, MEXICO	N	FGN	0	0	38	0	0	0	38	0
SJJ	SARAJEVO, YUGOSLAVIA	N	FGN	174	0	356	0	564	0	1094	0
SJO	SAN JOSE, COST RICA	N	FGN	3317	0	3409	0	3128	0	9854	0
SJU	SAN JUAN, PUERTO RICO	N	FGN	0	0	60	0	0	0	60	0
SKG	THESSALONIKI, GREECE	N	FGN	1987	0	1721	0	2473	0	6181	0
SKO	SOKOTO, NIGERIA	N	FGN	1182	0	732	0	598	0	2512	0
SKP	SKOPJE, YUGOSLAVIA	N	FGN	210	0	710	0	722	0	1642	0
SKS	SKRYDSTRUP, DENMARK	N	FGN	45	0	0	0	0	0	45	0
SKZ	SUKKUR, PAKISTAN	N	FGN	566	0	720	0	870	0	2156	0
SLA	SALTA, ARGENTINA	S	FGN	1934	0	1947	1	1622	0	5503	1
SLC	SALT LAKE CITY, UT, USA	N	YES	77961	1	72870	0	70403	2	221234	3
SLL	SALALAH, OMAN	N	FGN	882	0	964	0	1010	1	2856	1
SLZ	SAO LUIZ, MARANHAO, BRAZIL	S	FGN	3629	0	4701	1	7507	0	15837	1
SMF	SACRAMENTO, CA, USA	N	YES	18876	0	24452	1	19931	1	63259	2
SMI	SAMOS ISLAND, GREECE	N	FGN	1678	0	1608	0	1774	0	5260	0
SNA	ORANGE COUNTY, CA, USA	N	YES	24680	1	22489	0	23389	0	70558	1
SNN	SHANNON, IRELAND	N	FGN	1999	0	2715	0	3658	0	8372	0
SNO	SAKON NAKHOM, THAILAND	N	FGN	566	0	282	0	0	0	848	0
SOF	SOFIA, BULGARIA	N	FGN	671	0	547	0	462	0	1680	0
SPC	SANTA CRUZ LA PALMA, CANARY IS.	N	FGN	0	0	1272	0	1186	0	2458	0
SPP	MENONGUE, ANGOLA	S	FGN	224	0	208	0	346	0	778	0
SPU	SPLIT, YUGOSLAVIA	N	FGN	1592	0	2213	0	1915	0	5720	0
SRQ	SARASOTA/BRADENTON, FL, USA	N	YES	657	0	994	1	2481	1	4132	2
SSA	SALVADOR, BRAZIL	S	FGN	9230	0	11330	0	16768	0	37328	0
SSG	MALABO, EQUATORIAL GUINEA	N	FGN	126	0	206	0	96	0	428	0
STL	ST LOUIS, MO, USA	N	YES	20660	0	25797	0	30162	0	76619	0
STM	SANTAREM, BRAZIL	S	FGN	3318	0	3913	0	4380	0	11611	0
STN	LONDON-STANSTED, ENGLAND, UK	N	FGN	0	0	874	0	1745	1	2619	1
STR	STUTTGART, FRG	N	FGN	18747	1	19270	4	21956	2	59973	7
STT	ST THOMAS, VIRGIN ISLANDS	N	FGN	748	0	732	0	730	0	2210	0
STV	SURAT, INDIA	N	FGN	0	1	0	0	0	0	0	1
STX	ST CROIX, VIRGIN ISLANDS	N	FGN	730	0	732	0	730	0	2192	0
SUB	SURABAYA, INDONESIA	S	FGN	0	0	0	0	80	0	80	0
SUV	SUVA, FIJI	S	FGN	650	0	582	0	565	0	1797	0
SUX	SIOUX CITY, IO, USA	N	YES	1536	0	2844	0	2127	0	6507	0
SVB	SAMBAVA, MADAGASCAR	S	FGN	274	0	220	0	294	0	788	0
SVG	STAVANGER, NORWAY	N	FGN	16946	0	18466	0	19633	1	55045	1
SVO	MOSCOW-SHEREMETYE, U.S.S.R.	N	FGN	864	0	962	0	1320	0	3146	0
SVP	KUITO, ANGOLA	S	FGN	422	0	392	0	316	0	1130	0
SVQ	SEVILLE, SPAIN	N	FGN	0	0	804	0	2074	0	2878	0
SWA	SHANTON, P. R. CHINA	N	FGN	0	0	507	0	1166	0	1673	0
SBK	STRASBOURG, FRANCE	N	FGN	76	0	4	0	86	0	166	0
SXF	BERLIN, GDR	N	FGN	86	0	202	0	470	0	758	0
SXR	SRINAGAR, INDIA	N	FGN	2123	1	2035	1	2692	0	6850	2
SYA	SHEMYA IS., AS, USA	N	NO	0	0	16	0	0	0	16	0
SYD	SYDNEY, N.S.W., AUSTRALIA	S	FGN	16325	2	21343	0	33543	2	71211	4
SYR	SYRACUSE, NY, USA	N	YES	10961	0	18007	1	25961	0	54929	1
SYZ	SHIRAZ, IRAN	N	FGN	3868	0	3768	0	3554	0	11190	0
SZG	SALZBURG, AUSTRIA	N	FGN	648	0	653	0	650	0	1951	0
TAI	TAIZ, YEMEN	N	FGN	820	0	872	0	690	0	2382	0
TAO	QINGDAO, P.R. CHINA	N	FGN	0	0	0	0	157	0	157	0
TBO	TABORA, TANZANIA	S	FGN	36	0	0	0	0	0	36	0
TBP	TUMBES, PERU	S	FGN	404	0	576	0	338	0	1318	0
TBT	TABATINGA, BRAZIL	S	FGN	764	0	852	0	836	0	2452	0
TBU	TONGATAPU, TONGA ISLAND, PACIFIC	S	FGN	667	0	323	0	316	0	1306	0
TBZ	TABRIZ, IRAN	N	FGN	214	0	0	0	0	0	214	0
TCI	TENERIFE, CANARY IS.	N	FGN	0	0	0	0	0	1	0	1
TEE	TBESSA, ALGERIA	N	FGN	652	0	628	0	624	0	1904	0
TER	TERCEIRA, PORTUGAL (AZORES)	N	FGN	87	0	260	0	253	0	600	0
TET	TETE, MOZAMBIQUE	S	FGN	364	0	364	0	158	0	886	0
TEZ	TEZPUR, INDIA	N	FGN	728	0	732	0	730	0	2190	0
TFF	TEFE, BRAZIL	S	FGN	246	0	208	0	264	0	718	0
TFN	TENERIFE, SPAIN	N	FGN	0	0	1842	0	1640	0	3482	0
TFS	TENERIFFE-REINASOFIA, CANARY ISLAND	N	FGN	244	1	874	1	1499	1	2617	3

AIRPORT APTDEF		HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
TGD	TITOGRAD, YUGOSLAVIA	N	FGN	616	1	754	0	1002	0	2372	1
TGG	KUALA, TERENGGANU, MALAYSIA	N	FGN	438	0	418	0	640	0	1496	0
TGT	TANGA, TANZANIA	S	FGN	26	0	0	0	0	0	26	0
TGU	TEGUCIGALPA, HONDURAS	N	FGN	3746	0	4286	0	4645	0	12677	0
THE	TERESINA, PIAUI, BRAZIL	S	FGN	2920	0	3972	0	5418	0	12310	0
THR	TEHRAN, IRAN	N	FGN	4370	0	3536	0	4434	0	12340	0
TIA	TIRANA, ALBANIA	N	FGN	104	0	104	0	208	0	416	0
TIF	TAIF, SAUDI ARABIA	N	FGN	1484	0	926	0	888	0	3298	0
TIN	TINDOUF, ALGERIA	N	FGN	1006	0	962	0	966	0	2934	0
TIP	TRIPOLI, LIBYA	N	FGN	287	0	626	0	453	0	1366	0
TIV	TIVAT, YUGOSLAVIA	N	FGN	188	0	364	0	227	0	779	0
TKO	KIGOMA, TANZANIA	S	FGN	18	0	0	0	0	0	18	0
TLE	TULEAR, MADAGASCAR	S	FGN	490	0	528	0	348	0	1366	0
TLH	TALLAHASSEE, FL, USA	N	YES	0	0	1376	0	1711	0	3087	0
TLM	TILIMSEN, ALGERIA	N	FGN	1046	0	831	0	517	0	2394	0
TLS	TOULOUSE, FRANCE	N	FGN	1152	0	1107	0	1306	0	3565	0
TLV	TEL AVIV-YAFO, ISRAEL	N	FGN	2334	1	1608	0	2173	0	6115	1
TMM	TAMATAVE, MADAGASCAR	S	FGN	150	0	14	0	60	0	224	0
TMR	TAMANRASSET, ALGERIA	N	FGN	1228	0	1058	0	1136	0	3422	0
TMS	SAO TOME ISLAND, SAO TOME ISLAND	N	FGN	124	0	144	0	104	0	372	0
TNG	TANGIER, MOROCCO	N	FGN	2117	3	2241	0	2281	1	6639	4
TNN	TAINAN, TAIWAN	N	FGN	3324	0	3452	0	3444	0	10220	0
TNR	ANTANANARIVO, MADAGASCAR	S	FGN	1953	0	1801	0	1659	0	5413	0
TOE	TOZEUR, TUNISIA	N	FGN	86	0	18	0	4	0	108	0
TOL	TOLEDO, OH, USA	N	YES	1724	0	1192	0	545	0	3461	0
TOS	TROMSO, NORWAY	N	FGN	2080	0	2518	0	2557	0	7155	0
TOY	TOYAMA, JAPAN	N	FGN	1522	0	446	0	48	0	2016	0
TPA	TAMPA/ST PETERSBURG, FL, USA	N	YES	19425	0	19630	0	24615	1	63670	1
TPE	TAIPEI, TAIWAN	N	FGN	0	0	34	0	366	0	400	0
TPP	TARAPOTO, PERU	S	FGN	656	0	486	0	964	0	2106	0
TRD	TRONDHEIM, NORWAY	N	FGN	11039	0	13061	0	14345	0	38445	0
TR1	TRI-CITY AIRPORT, TN, USA	N	YES	2166	0	2926	0	2413	0	7505	0
TRN	TURIN, ITALY	N	FGN	932	0	1798	1	2048	0	4778	1
TRU	TRUJILLO, PERU	S	FGN	28	0	28	0	450	0	506	0
TRV	TRIVANDRUM, INDIA	N	FGN	2374	3	2708	1	2714	0	7796	4
TRW	TARAWA, REP OF KIRIBATI	N	FGN	106	0	104	0	52	0	262	0
TRZ	TIRUCHIRAPALLY, INDIA	N	FGN	2318	0	2094	0	2052	0	6464	0
TSA	TAIPEI-SUNG SHAN, TAIWAN	N	FGN	22439	0	26214	0	28454	0	77107	0
TSF	TREVISIO, ITALY	N	FGN	0	0	0	0	110	0	110	0
TSN	TIANJIN, P. R. CHINA	N	FGN	954	0	1421	0	1550	0	3925	0
TSV	TOWNSVILLE, QLD, AUSTRALIA	S	FGN	6252	1	6051	0	7323	1	19626	2
TTJ	TOTTORI, JAPAN	N	FGN	1460	0	1464	1	1460	1	4384	2
TTT	TAITUNG, TAIWAN	N	FGN	1488	0	1802	0	1880	0	5170	0
TUC	TUCUMAN, ARGENTINA	S	FGN	2409	0	2433	2	2264	1	7106	3
TUI	TURAIF, SAUDI ARABIA	N	FGN	0	0	0	0	38	0	38	0
TUL	TULSA, OK, USA	N	YES	30215	0	29642	3	25417	0	85274	3
TUN	TUNIS, TUNISIA	N	FGN	5129	1	3906	1	4307	0	13342	2
TUR	TUCURUI, BRAZIL	S	FGN	419	0	417	0	187	0	1023	0
TUS	TUCSON, AZ, USA	N	YES	14844	0	14048	0	19849	0	48741	0
TUU	TABUK, SAUDI ARABIA	N	FGN	4152	0	3910	0	3222	0	11284	0
TVL	LAKE TAHOE, CA, USA	N	YES	2274	1	1985	0	1982	0	6241	1
TWU	TAJAU, SABAH, MALAYSIA	N	FGN	2920	0	2928	0	4256	0	10104	0
TXL	WEST BERLIN, GERMANY	N	FGN	17484	1	18958	0	28902	0	65344	1
TYL	TALAR, PERU	S	FGN	12	0	700	0	338	0	1050	0
TYN	TAIYUAN, P. R. CHINA	N	FGN	104	0	122	0	182	0	408	0
TYS	KNOXVILLE, TN, USA	N	YES	4917	0	5269	0	5066	0	15252	0
UAQ	SAN JUAN, ARGENTINA	SS	FGN	546	0	706	0	614	0	1866	0
UBA	UBERABA, BRAZIL	SS	FGN	1186	0	1464	0	1460	0	4110	0
UBJ	UBE, JAPAN	NN	FGN	2496	0	1411	0	1247	0	5154	0
UBP	UBON PATCHATHANI, THAILAND	N	FGN	730	0	732	0	394	0	1856	0
UDI	UBERLANDIA, BRAZIL	SS	FGN	1186	0	1464	0	1460	0	4110	0
UDR	UDAIPUR, INDIA	NN	FGN	1460	0	2126	0	1866	1	5452	1
UEL	QUELIMANE, MOZAMBIQUE	SS	FGN	418	0	420	0	208	0	1046	0
UET	QUETTA, PAKISTAN	NN	FGN	832	1	1566	0	1652	0	4050	1
UIO	QUITO, ECUADOR	S	FGN	1609	0	0	0	0	0	1609	0
UNK	UNALAKLEET, AS, USA	N	NO	4	0	270	0	658	0	932	0
URT	SURAT THANI, THAILAND	NN	FGN	798	0	1272	0	1202	0	3272	0
URY	GURAYAT, SAUDI ARABIA	N	FGN	740	0	942	0	866	0	2548	0
USH	USHUAIA, ARGENTINA	S	FGN	1804	0	1544	0	1532	0	4880	0
UTH	UDON, THANI, THAILAND	NN	FGN	738	0	732	0	314	0	1784	0
UTN	UPINGTON, SOUTH AFRICA	S	FGN	882	0	856	0	832	1	2570	1
UTP	UTAPAO, THAILAND	NN	FGN	0	0	184	0	356	0	540	0
UVL	NEW VALLEY, ARAB REP OF EGYPT	N	FGN	315	0	312	0	312	0	939	0
VBY	VISBY, SWEDEN	N	FGN	0	0	0	0	2	0	2	0
VCE	VALVERDE, CANARY ISLANDS	N	FGN	1729	0	1335	0	1588	1	4652	1

AIRPORT APTDEF		HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
VCP	SAO PAULO - VIRACOPOS, BRAZIL	S	FGN	104	0	56	0	0	0	160	0
VDM	VIEDMA, ARGENTINA	S	FGN	416	1	460	0	540	0	1416	1
VFA	VICTORIA FALL, ZIMBABWE	S	FGN	610	0	1292	0	1232	0	3134	0
VHC	SAURIMO, ANGOLA	S	FGN	252	0	234	0	384	0	870	0
VIE	VIENNA, AUSTRIA	N	FGN	5820	0	6195	0	7904	2	19919	2
VIL	DAKHLA, MOROCCO	N	FGN	8	0	58	0	78	0	144	0
VIX	VITORIA, ESPIRITO SANTO, BRAZIL	S	FGN	2878	0	3794	0	4160	0	10832	0
VLC	VALENCIA, SPAIN	N	FGN	206	0	342	0	1296	0	1844	0
VLG	VILLA GESELL, ARGENTINA	S	FGN	154	0	148	0	104	0	406	0
VLI	PORT VILA, VANUATU	S	FGN	251	0	560	0	934	0	1745	0
VNC	VENICE, ITALY	N	FGN	0	0	0	0	0	1	0	1
VNS	VARANASI, INDIA	N	FGN	3150	4	2686	3	2466	1	8302	8
VRN	VERONA, ITALY	N	FGN	0	0	3	0	8	0	11	0
VTE	VIENTIANE, LAOS	N	FGN	0	0	52	0	142	0	194	0
VTZ	VISHAKHAPATNAM, INDIA	N	FGN	1722	0	1774	0	1902	0	5398	0
VVI	SANTA CRUZ, VIRU VIRU, BOLIVIA	S	FGN	104	0	208	0	466	0	778	0
VXC	LICHINGA, MOZAMBIQUE	S	FGN	312	0	318	0	110	0	740	0
WAW	WARSAW, POLAND	N	FGN	1027	0	755	0	1162	0	2944	0
WDH	WINDOEK, NAMIBIA	S	FGN	1862	1	1988	0	1942	1	5792	2
WKJ	WAKKANAI, JAPAN	N	FGN	0	0	550	0	562	0	1112	0
WLG	WELLINGTON, NEW ZEALAND	S	FGN	17828	2	28370	1	29044	1	75242	4
WLS	WALLIS IS, WALLIS & FUTUNA IS	S	FGN	0	0	0	0	180	0	180	0
WRG	WRANGELL, AS, USA	N	NO	1460	0	1464	0	1460	0	4384	0
WUH	WUHAN, P. R. CHINA	N	FGN	2002	0	2073	0	1307	0	5382	0
XMN	XIAMEN, P. R. CHINA	N	FGN	2254	0	3433	1	4474	1	10161	2
XRY	JEREZ DE LA FRONTERA, SPAIN	N	FGN	0	1	0	0	0	0	0	1
YAK	YAKUTAT, AS, USA	N	NO	1460	0	1464	0	1460	0	4384	0
YAM	SAULT STE MARIE, ONT., CANADA	N	FGN	3540	1	3286	1	1338	0	8164	2
YAO	YAOUNDE, REP OF CAMEROON	N	FGN	4147	0	3353	0	3493	0	10993	0
YBC	BAIE COMEAU, QUEBEC, CANADA	N	FGN	276	0	106	0	252	0	634	0
YBG	SAGUENAY, QUE, CANADA	N	FGN	520	0	264	0	244	0	1028	0
YBR	BRANDON, MAN, CANADA	N	FGN	1252	0	948	0	224	0	2424	0
YCB	CAMBRIDGE BAY, NWT, CANADA	N	FGN	239	0	296	0	338	0	873	0
YCG	CASTLEGAR, BC, CANADA	N	FGN	626	0	364	0	0	0	990	0
YCH	CHATHAM, NB, CANADA	N	FGN	626	0	550	0	56	0	1232	0
YCL	CHARLO, NB, CANADA	N	FGN	626	0	550	0	56	0	1232	0
YDF	DEER LAKE, NFLD, CANADA	N	FGN	2855	0	2432	0	2131	0	7418	0
YDQ	DAWSON CREEK, BC, CANADA	N	FGN	626	0	310	0	0	0	936	0
YEG	EDMONTON, ALTA, CANADA	N	FGN	11693	0	10938	0	10359	0	32990	0
YEV	INUVIK, NWT, CANADA	N	FGN	745	0	912	0	1232	0	2889	0
YFB	IQALIUT, NWT, CANADA	N	FGN	1769	0	1576	0	1714	0	5059	0
YFC	FREDERICTON, NB, CANADA	N	FGN	1342	0	1054	0	1120	0	3516	0
YFO	FLIN FLON, MAN, CANADA	N	FGN	420	0	374	0	406	0	1200	0
YFS	FT SIMPSON, NWT, CANADA	N	FGN	0	0	0	0	42	0	42	0
YGJ	YONAGO, JAPAN	N	FGN	2190	0	2008	0	2180	0	6378	0
YGL	LA GRANDE, QUE, CANADA	N	FGN	1044	0	1092	0	1050	0	3186	0
YGW	KUUJUARAPIK, QUE, CANADA	N	FGN	522	0	524	0	520	0	1566	0
YGX	GILLAM, MAN, CANADA	N	FGN	832	0	848	0	844	0	2524	0
YHD	DRYDEN, ONT, CANADA	N	FGN	2699	0	1520	0	0	0	4219	0
YHY	HAY RIVER, NWT, CANADA	N	FGN	1252	0	1256	1	1252	1	3760	2
YHZ	HALIFAX, NS, CANADA	N	FGN	14221	0	14832	0	14257	2	43310	2
YJT	STEPHENVILLE, NFLD, CANADA	N	FGN	144	0	0	0	0	0	144	0
YKA	KAMLOOPS, BC, CANADA	N	FGN	2650	0	2804	1	1498	0	6952	1
YLW	KELOWNA, BC, CANADA	N	FGN	8790	0	7473	2	5321	0	21584	2
YMM	FT McMURRAY, ALTA, CANADA	N	FGN	1148	0	1152	1	1144	0	3444	1
YMS	YURI MAGUAS, PERU	S	FGN	210	0	264	0	96	0	570	0
YMX	MONTRÉAL MIRABEL, QUE, CANADA	N	FGN	569	0	138	0	1	0	708	0
YNB	YANBU, SAUDI ARABIA	N	FGN	2513	0	2511	0	2533	0	7557	0
YNG	YOUNGSTOWN, OH, USA	N	YES	330	0	0	0	0	0	330	0
YOL	YOLA, NIGERIA	N	FGN	1279	0	1261	0	792	0	3332	0
YOW	OTTAWA, ONT, CANADA	N	FGN	10695	0	15822	0	15489	1	42006	1
YPR	PRINCE RUPERT, BC, CANADA	N	FGN	1436	0	1412	0	1548	0	4396	0
YQB	QUEBEC, QUE, CANADA	N	FGN	1356	0	1003	1	1309	1	3668	2
YQQ	THE PAS, MAN, CANADA	N	FGN	630	0	628	0	624	0	1882	0
YQG	WINDSOR, ONT, CANADA	N	FGN	2351	0	1093	0	14	0	3458	0
YQH	WATSON LAKE, YT, CANADA	N	FGN	335	0	184	0	0	0	519	0
YQM	MONCTON, NB, CANADA	N	FGN	0	0	557	0	525	0	1082	0
YQR	REGINA, SASK, CANADA	N	FGN	3925	0	4110	1	5168	0	13203	1
YQT	THUNDER BAY, ONT, CANADA	N	FGN	6659	0	5058	1	3257	0	14974	1
YQU	GRANDE PRAIRIE, ALBA, CANADA	N	FGN	1568	0	912	0	0	0	2480	0
YQX	GANDER, NFLD, CANADA	N	FGN	748	0	675	0	62	0	1485	0
YQY	SYDNEY, NS, CANADA	N	FGN	1846	0	1464	0	1342	0	4652	0
YQZ	QUESNEL, BC, CANADA	N	FGN	442	0	304	0	0	0	746	0
YRB	RESOLUTE, NT, CANADA	N	FGN	417	0	418	0	416	0	1251	0
YRT	RANKIN INLET, NWT, CANADA	N	FGN	0	0	0	0	328	0	328	0

AIRPORT APTDEF		HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	ING5
YSB	SUBDURY, ONT, CANADA	N	FGN	1092	0	0	0	0	0	1092	0
YSJ	SAINT JOHN, NB, CANADA	N	FGN	1358	0	1464	0	1319	0	4141	0
YSM	FT SMITH, NWT, CANADA	N	FGN	1252	0	1256	0	1252	0	3760	0
YSR	NANISIVIK NWT, CANADA	N	FGN	208	0	210	0	246	0	664	0
YTH	THOMPSON, MAN, CANADA	N	FGN	1006	0	1008	0	1016	0	3030	0
YUL	MONTREAL, QUEBEC, CANADA	N	FGN	19081	1	23752	2	22533	4	65366	7
YUM	YUMA, AZ, USA	N	YES	31	0	408	0	0	0	439	0
YUX	HALL BEACH, NWT, CANADA	N	FGN	210	0	210	0	208	0	628	0
YUY	ROUYN-NORANDA, QUEBEC, CANADA	N	FGN	0	0	0	0	48	0	48	0
YVO	VAL D'OR, QUE, CANADA	N	FGN	1887	0	1204	0	1299	1	4390	1
YVP	FT CHIMO, QUE, CANADA	N	FGN	1178	0	1036	0	1408	0	3622	0
YVQ	NORMAN WELLS, NWT, CANADA	N	FGN	1133	0	1618	0	1588	1	4339	1
YVR	VANCOUVER, BC, CANADA	N	FGN	38426	0	38128	3	33322	3	109876	6
YWG	WINNIPEG, MAN, CANADA	N	FGN	13898	0	16176	2	14677	1	44751	3
YWK	WABUSH, NFLD, CANADA	N	FGN	964	0	976	0	1050	0	2990	0
YWL	WILLIAMS LAKE, BC, CANADA	N	FGN	442	0	304	0	0	0	746	0
YXC	CRANBROOK, BC, CANADA	N	FGN	2712	0	2800	0	1714	0	7226	0
YXD	EDMONTON-MUNICIPAL, ALBERTA, CANADA	N	FGN	10271	1	11878	0	11943	1	34092	2
YXE	SASKATOON, SASK, CANADA	N	FGN	3934	0	4688	0	5216	0	13838	0
YXJ	FT ST JOHN, BC, CANADA	N	FGN	3958	1	3491	1	2242	0	9691	2
YXS	PRINCE GEORGE, BC, CANADA	N	FGN	5052	1	4592	0	3975	1	13619	2
YXT	TERRACE, BC, CANADA	N	FGN	1790	0	1412	0	1594	0	4796	0
YXU	LONDON, ONT, CANADA	N	FGN	422	0	992	0	341	0	1755	0
YXY	WHITEHORSE, YT, CANADA	N	FGN	1479	0	1382	0	1552	0	4413	0
YYC	CALGARY, ALBERTA, CANADA	N	FGN	33327	1	33794	0	29159	4	96280	5
YYD	SMITHERS, BC, CANADA	N	FGN	904	0	1274	0	1306	0	3484	0
YYE	FT NELSON, BC, CANADA	N	FGN	962	0	548	0	0	0	1510	0
YYF	PENTICTON, BC, CANADA	N	FGN	2964	0	1643	0	0	0	4607	0
YYG	CHARLOTTETOWN, PEI, CANADA	N	FGN	1699	0	1403	0	852	0	3954	0
YYJ	VICTORIA, BC, CANADA	N	FGN	871	0	1265	1	690	1	2826	2
YYL	LYNN LAKE, MAN, CANADA	N	FGN	32	0	32	0	0	0	64	0
YYQ	CHURCHILL, MAN, CANADA	N	FGN	412	0	424	0	422	0	1258	0
YYR	GOOSE BAY, NFLD, CANADA	N	FGN	1733	0	1721	0	1898	0	5352	0
YYT	ST JOHNS, NFLD, CANADA	N	FGN	4331	0	4782	1	4680	0	13793	1
YYY	MONT JOLI, QUE, CANADA	N	FGN	276	0	106	0	242	0	624	0
YYZ	TORONTO, ONTARIO, CANADA	N	FGN	44100	1	49334	1	43077	1	136511	3
YZF	YELLOWKNIFE, NWT, CANADA	N	FGN	3253	0	3578	0	5142	1	11973	1
YZP	SANDSPIT, BC, CANADA	N	FGN	774	0	1282	0	1260	1	3316	1
YZT	PORT HARDY, BC, CANADA	N	FGN	708	0	0	0	0	0	708	0
YZV	SETP-ILES, QUE, CANADA	N	FGN	603	0	612	0	640	0	1855	0
ZAD	ZADAR, YUGOSLAVIA	N	FGN	52	0	109	0	164	0	325	0
ZAG	ZAGREB, YUGOSLAVIA	N	FGN	6743	0	8422	0	9322	0	24487	0
ZAH	ZAHEDAN, IRAN	N	FGN	88	0	210	0	160	0	458	0
ZCO	TEMUCO, CHILE	S	FGN	0	0	558	0	834	0	1392	0
ZHA	ZHANGJIANG, P. R. CHINA	N	FGN	416	0	579	0	723	0	1718	0
ZIH	IXTAPA/ZIHUATANEJO, MEXICO	N	FGN	44	0	146	0	482	0	672	0
ZNZ	ZANZIBAR, TANZANIA	S	FGN	1098	0	412	0	210	0	1720	0
ZRH	ZURICH, SWITZERLAND	N	FGN	12226	3	13751	0	15344	0	41321	3
ZTH	ZAKINTHOS, GREECE	N	FGN	676	1	718	0	748	1	2142	2
ZUM	CHURCHILL FALLS, NFLD, CANADA	N	FGN	216	0	210	0	192	0	618	0

APPENDIX B

CONTENTS OF FAA BIRD INGESTION DATA BASE BOEING 737 AIRPLANE OCTOBER 1986 - SEPTEMBER 1989

This appendix presents the contents of the Boeing 737 bird ingestion data base maintained by the FAA. The appendix presents actual data extracted from the FAA data base, and it consists of two sections. The first section contains the bird ingestion data supplied by the engine manufacturers and the FAA, and the second section contains data supplied to the FAA from ICAO. The contents of the data base are described below:

<u>COLUMN</u>	<u>DESCRIPTION OF COLUMN CONTENTS</u>
EDATE	Date (mm/dd/yyyy) of ingestion event.
EVT#	FAA bird ingestion event sequence number reflecting order in which events were entered into the FAA bird ingestion data base.
ENG_POS	Engine position of engine ingesting bird. Since each engine ingestion event has a unique record in the data base, duplicate event numbers indicate multiple engine ingestion events. This column provides record uniqueness in such cases. 1 - left engine of 737 airplane 2 - right engine of 737 airplane
ETIME	Local time of bird ingestion.
SIGN_EVT	Significant event factors. AIRWRTHY - engine related airworthiness effects INV POS LOSS - involuntary power loss MULT BIRDS - multiple birds in 1 engine MULT ENG - multiple engine ingestion (1 bird in each engine) MULT ENG-BIRDS - multiple engine ingestion and 1 or both engines sustained multiple bird ingestion TRVS FRAC - transverse fan blade fracture OTHER - other significant factor, may be reported in narrative remarks NONE - no significant factor noted
AIRCRAFT	737 aircraft type.
POF	Phase of flight during which bird ingestion occurred. (TAXI;TAKEOFF;CLIMB;CRUISE;APPROACH;LANDING;UNKNOWN)
ALTITUDE	Altitude (ft. AGL) at time of bird ingestion.
SPEED	Airspeed (kn) at time of bird ingestion.

FL_RULES Flight rules in effect at time of bird ingestion.
 IFR - instrument flight rules
 VFR - visual flight rules
 UNK - unknown

LT_CONDS Light conditions at time of bird ingestion.
 (DARK;LIGHT;DAWN;DUSK;etc.)

WEATHER Weather conditions at time of bird ingestion.

CREW_AC Crew action taken in response to bird ingestion.
 ATO - aborted takeoff
 ATB - air turnback
 DIV - diversion
 UNK - unknown
 NONE - no crew action taken
 N/A - not applicable
 OTHER - some action taken, may be specified in narrative remarks

CREW_AL Indicates whether crew alerted to presence of birds at time of bird ingestion.
 (YES;NO;UNKNOWN)

BIRD_SEE Indicates whether ingested bird(s) seen prior to ingestion
 NO - not seen
 YES - seen
 SEVERAL - 2 to 10 birds observed
 FLOCK - more than 10 birds observed

BIRD_NAM Common bird name. Trailing asterisk (*) implies bird not positively identified as such.

BIRD_SPE Species of positively identified bird. Alphanumeric identification code which conforms to Edward's[†] convention.

#_BIRDS Number of birds ingested. An asterisk (*) implies more than one bird; however, the exact count is unknown.

WT_OZ_1 Weight (oz.) of first ingested bird.

CTY_PRS Scheduled city pairs of aircraft operation.
 (from code:to code) 3 letter city airport code. Reference AIRPORT column in Appendix A.

AIRPORT Airport at which bird ingestion event occurred.
 3 letter airport code. Reference AIRPORT column in Appendix A.

[†] Edwards, E.P., "A Coded List of Birds of the Worlds,"
 ISBN:911882-04-9, 1974

LOCALE	Nearest town, state, country, etc.
US_INCID	Indicates whether bird ingestion occurred within US boundaries. (YES;NO)
ENGINE	Engine model. (CFM56;JT8D)
DASH	Engine dash number.
DMG_CODE	<p>Letter codes summarizing engine damage resulting from the bird ingestion. This column does not exist in the actual FAA database, but was developed by the contractor to compress 17 YES/NO damage fields into a single column. A letter code appears for damage columns whose values are YES. In the explanation of damage codes below, a number in parentheses indicates the damage severity code which is further explained in the SEVERITY column. The database column name is given in the explanation of the damage code.</p> <ul style="list-style-type: none"> A(4) - ENG DAM; engine damaged due to bird ingestion B(3) - LEAD EDG; leading edge distortion/curl, minor fan blades C(3) - BEN/DEN; 1 to 3 fan blades bent or dented D(2) - BE/DE>3; more than 3 fan blades bent or dented E(3) - TORN<3; 1 to 3 fan blades torn F(2) - TORN>3; more than 3 fan blades torn G(2) - BROKEN; broken fan blade(s), leading edge and/or tip pieces missing; other blades also dented H(3) - SHINGLED; shingled (twisted) fan blades I(1) - TRVSFRAC; transverse fracture - a fan blade broken chordwise (across) and the piece liberated (includes secondary hard object damage) J(2) - SPINNER; dented, broken, or cracked spinner (includes spinner cap) K(1) - CORE; bent/broken compressor blades/vanes, blade/vane clash, blocked/disrupted airflow in low, intermediate, and high pressure compressors L(3) - NACELLE; dents and/or punctures to the engine enclosure (includes cowl) M(1) - FLANGE; flange separations N(2) - RELEASED; released (walked) fan blades (blade retention mechanism broken) O(1) - TURBINE; turbine damage P - OTHER; any damage not previously listed Q - UNKNOWN;
NOTE:	The maximum number of damage codes listed for an engine ingestion event is three. These three damage codes reflect the most severe damage that occurred. There may be other damage that occurred which is less severe that may be listed in the remarks column.
SEVERITY	Numeric code indicating the severity of engine damage resulting from the bird ingestion. This column was developed by the contractor after analyzing reported damage in the data base. The

lower the severity code, the more severe the damage. The severity rating of a flight is determined as the lowest severity rating attained by any of the damage categories. Corresponding severity ratings for each damage category were presented in the DMG_CODE discussion above.

- 1 - most severe damage (damage is known)
- 2 - moderately severe damage (damage is known)
- 3 - least severe damage (damage is known)
- 4 - damage indicated, but not specified
- 9 - no damage reported

<u>POW_LOSS</u>	Degree of power loss as a result of bird ingestion NONE - no power loss EPR DEC - engine pressure ratio decrease SPOOL DOWN - engine spooled down N1 CHANGE - N1 rotor change N2 CHANGE - N2 rotor change COMPRESSOR - compressor surge/stall UNKNOWN - unknown whether power loss occurred
<u>MAX_VIBE</u>	Maximum vibration reported as a dimensionless unit.
<u>THROTTLE</u>	Voluntary throttle change by crew in response to bird ingestion. ADVANCE - voluntary throttle advance RETARD - voluntary throttle retard IDLE - voluntary throttle retard to idle CUTOFF voluntary throttle retard to cutoff NONE - no voluntary throttle change
<u>IFSD</u>	Indicates whether in-flight shutdown occurred in response to bird ingestion. NO - no shutdown VIBES - shutdown due to vibrations STAL/SURG - shutdown due to compressor stall/surge HI EGT - shutdown due to high exhaust gas temperature EPR - shutdown due to incorrect engine pressure ratio INVLNTRY - involuntary engine shutdown PARAMTRS - shutdown due to incorrect engine parameters OTHER - other reasons, may be listed in remarks UNKNOWN - unknown cause for shutdown
<u>REMARKS</u>	Narrative description providing additional information concerning some aspect of the ingestion.

SOURCE	ENGINE	MANUFACTURER	SIGN_EVT	AIRCRAFT_POF	ALTITUDE	SPEED	FL_RULES	L1_CONDS	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
E DATE	EVT#	ENG_POS	ETIME									
10/01/1986	1	1	NONE	300 UNKNOWN CLIMB	700	1FR	OVERCAST	CLEAR	ATB	NO	YES	NONE DIV
10/02/1986	2	2	16:20:00	300 NONE TAXI	0	VFR	CLEAR	CLEAR	NONE	NONE		
10/02/1986	3	2	NONE	300 UNKNOWN TAXI	100	160	VFR	LIGHT	ATB	NO		
10/04/1986	235	1	NONE	300 UNKNOWN TAKEOFF	0	VFR	DAWN	SCATTERED	ATB	ATB		
10/05/1986	5	2	NONE	300 UNKNOWN TAXI	100	160	VFR	DAWN	ATB	ATB		
10/08/1986	233	2	NONE	300 UNKNOWN TAKEOFF	146	VFR	DAWN	SCATTERED	ATB	ATB	FLOCK	
10/10/1986	234	2	8:00:00	300 MULT ENG	300	VFR	DAWN	CLEAR	NONE	NONE		
10/10/1986	6	1	MULT ENG	300 MULT ENG	0	125	VFR	CLEAR	NONE	NONE		
10/13/1986	6	2	8:00:00	300 NONE	200 APPROACH	0	90	CLEAR	NONE	NONE		
10/14/1986	232	2	NONE	200 MULT ENG-BIRDS	200 APPROACH	0	90	CLEAR	NONE	NONE		
10/16/1986	10	2	NONE	200 MULT ENG-BIRDS	200 APPROACH	0	90	CLEAR	NONE	NONE		
10/16/1986	230	1	NONE	200 MULT ENG-BIRDS	200 APPROACH	0	90	CLEAR	NONE	NONE		
10/19/1986	231	1	NONE	200 MULT ENG-BIRDS	200 APPROACH	0	90	CLEAR	NONE	NONE		
10/20/1986	228	1	NONE	200 UNKNOWN TAKEOFF	0	0	0	0	ATO	ATO		
10/20/1986	230	1	NONE	200 UNKNOWN TAKEOFF	145	0	0	0	ATB	ATB		
10/21/1986	226	2	NONE	200 UNKNOWN TAKEOFF	145	0	0	0	NONE	NONE		
10/23/1986	662	1	MULT BIRDS	200 UNKNOWN TAKEOFF	0	130	VFR	PARTLY CLOUD	NONE	NONE		
10/25/1986	236	2	NONE	200 UNKNOWN TAKEOFF	0	90	VFR	DAY	NONE	NONE		
10/26/1986	8	2	MULT ENG	300 UNKNOWN TAKEOFF	0	20	VFR	DAY	ATB	ATB		
10/26/1986	9	2	MULT ENG-BIRDS	300 UNKNOWN TAKEOFF	0	20	VFR	DAY	NONE	NONE		
10/28/1986	423	2	NONE	200 UNKNOWN TAKEOFF	0	100	VFR	OVERCAST	NO	NO		
10/28/1986	10	1	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
10/29/1986	11	1	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
10/29/1986	12	1	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
10/30/1986	225	1	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
11/01/1986	13	2	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
11/02/1986	423	2	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
11/03/1986	14	1	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
11/04/1986	15	1	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
11/04/1986	73	2	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
11/04/1986	161	1	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
11/07/1986	16	2	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
11/09/1986	74	1	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
11/09/1986	17	1	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
11/10/1986	18	2	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
11/10/1986	19	2	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
21:13:00	NONE	NONE	NONE	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
18:30:00	MULT ENG-BIRDS	21	2	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
18:30:00	MULT ENG-BIRDS	21	2	200 UNKNOWN TAKEOFF	0	145	VFR	OVERCAST	NO	NO		
15:51:00	MULT ENG-BIRDS	25	1	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
23:08:00	MULT ENG-BIRDS	26	1	200 UNKNOWN TAKEOFF	500	0	0	0	ATB	ATB		
13:00:00	MULT ENG	27	2	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
15:50:00	MULT ENG	28	2	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
19:30:00	MULT ENG	300	1	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
11/24/1986	300	2	NONE	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
11/26/1986	29	2	NONE	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
11/26/1986	30	2	NONE	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
11/27/1986	424	1	NONE	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
11/29/1986	77	1	NONE	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
12/02/1986	72	1	NONE	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
12/03/1986	32	1	NONE	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
12/08/1986	34	1	NONE	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
12/12/1986	35	2	NONE	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
12/13/1986	36	2	NONE	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
12/13/1986	79	2	NONE	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
12/14/1986	37	2	NONE	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		
12/14/1986	57	2	NONE	200 UNKNOWN TAKEOFF	0	120	VFR	OVERCAST	NO	NO		

SOURCE : ENGINE MANUFACTURER

EDATE	EVT#	ENG	POS	BIRD_NAM	BIRD SPE #	BIRDS WT_OZ_1	CITY PRS	AIRPORT	LOCATE	US_INCD	ENGINE DASH
10/01/1986	1	1							BELGRADE, YUGOSLAVIA	NO	CFM56
10/02/1986	2	2							LAKE TAHOE, CA	YES	CFM56
10/02/1986	3	2							CHENGDU, CHINA	NO	CFM56
10/04/1986	235	2							CHINA	NO	JTB0
10/05/1986	4	2		GULL*					HARRISBURG, PA	YES	CFM56
10/06/1986	5	2							BEIJING, CHINA	NO	JTB0
10/10/1986	233	2							INDIA	NO	CFM56
10/10/1986	234	2		GRAY-HEADED LAPWING	SN20	1	MAN -DG	MAN	MANCHESTER, ENGLAND	NO	JTB0
10/13/1986	6	2		GRAY-HEADED LAPWING	SN20	1	9.6	KMG	KUNMING, CHINA	NO	CFM56
10/14/1986	232	2		STARLING	21275	1	-BOM	BOM	KUNMING, CHINA	NO	CFM56
10/16/1986	7	2		STARLING	21275	1	9.		BOMBAY, INDIA	NO	CFM56
10/19/1986	230	1							DALLAS/FT WORTH, TEX-LOVE	YES	CFM56
10/19/1986	231	1							DALLAS/FT WORTH, TEX-LOVE	YES	CFM56
10/20/1986	228	1							TRIVANDRUM, INDIA	NO	JTB0
10/20/1986	229	1							EAST LONDON, SOUTH AFRICA	NO	JTB0
10/21/1986	226	2							CHINA	NO	JTB0
10/21/1986	227	1							CALCUTTA, INDIA	NO	JTB0
10/23/1986	62	1							GAUHATI, INDIA	NO	JTB0
10/25/1986	236	2							GUATEMALA CITY, GUATEMALA	NO	JTB0
10/26/1986	8	2		ROCK DOVE	2P1	1	SNA	SNA	ORANGE COUNTY, CA	YES	CFM56
10/28/1986	9	2		ROCK DOVE	2P1	1	PIT-ROA	ROA	ORANGE COUNTY, CA	YES	CFM56
10/28/1986	10	1		ROBIN OR PIGEON*			PIT-ROA	ROA	ROANOAK, VA	YES	CFM56
10/29/1986	11	1		BLACK-HEADED GULL	14N36	1	DAL	DAL	ROANOAK, VA	YES	CFM56
10/30/1986	12	1					CLT	CLT	DALLAS/FT WORTH, TEX-LOVE	YES	CFM56
10/31/1986	225	1					BHM	BHM	CHARLOTTE, NC	YES	CFM56
11/01/1986	13	1		NIGHTHAWK	5T5	1	GAU-	GAU-	BIRMINGHAM, ALA	YES	CFM56
11/02/1986	423	2				2.			INDIA	NO	JTB0
11/03/1986	14	1							MIDWAY AIRPORT	YES	JTB0
11/04/1986	15	1							KARACHI, PAKISTAN	NO	JTB0
11/04/1986	73	2							ALBANY, NY	NO	JTB0
11/04/1986	16	1							HYDERABAO, INDIA	YES	JTB0
11/07/1986	16	2								NO	JTB0
11/09/1986	74	1							CHRISTCHURCH, NEW ZEALAND	NO	JTB0
11/09/1986	17	1							SRINAGAR, INDIA	NO	JTB0
11/09/1986	18	2							SAN ANTONIO, TX	YES	JTB0
11/10/1986	19	2							DENVER, CO	YES	JTB0
11/10/1986	20	1							CHARLOTTE, NC	YES	JTB0
11/10/1986	21	2							PENANG, MAY	NO	JTB0
11/10/1986	22	1							BANGALORE, INDIA	NO	JTB0
11/10/1986	23	1							BHUBANESWAR, INDIA	NO	JTB0
11/09/1986	15	1							CHICAGO, IL	YES	JTB0
11/04/1986	173	2							CHICAGO, IL	YES	JTB0
11/04/1986	161	1							CAIRNS, QLD, AUSTRALIA	NO	JTB0
11/07/1986	162	2							AMSTERDAM, NETHERLANDS	NO	JTB0
11/07/1986	163	1							DALLAS/FT WORTH, TEX-LOVE	YES	JTB0
11/09/1986	174	1							LTHUE, KAJAII, HAWAII	YES	JTB0
11/09/1986	18	2							KEDAH, MALAYSIA	NO	JTB0
11/10/1986	19	2							LAHORE, PAKISTAN	NO	JTB0
11/10/1986	20	1							LAHORE, PAKISTAN	NO	JTB0
11/10/1986	21	2							HOUSTON, TEX	YES	JTB0
11/14/1986	75	1							WELLINGTON, NEW ZEALAND	NO	JTB0
11/14/1986	76	1							WELLINGTON, NEW ZEALAND	NO	JTB0
11/15/1986	21	1							LILONGWE, MALAWI	NO	JTB0
11/15/1986	22	1							NEW YORK, NY	YES	JTB0
11/15/1986	23	1							PORTLAND, ORE	YES	JTB0
11/18/1986	24	1							BANGALORE, INDIA	NO	JTB0
11/20/1986	25	1							CHRISTCHURCH, NEW ZEALAND	NO	JTB0
11/22/1986	26	1							ARGENTINA	NO	JTB0
11/23/1986	27	1							DALLAS/FT WORTH, TEX-LOVE	YES	JTB0
11/23/1986	27	2							TENERIFE	NO	JTB0
11/23/1986	28	1							AMSTERDAM, NETHERLANDS	NO	JTB0
11/25/1986	29	1							SAN FRANCISCO/OAKLAND, CA	YES	JTB0
11/26/1986	30	2							CHRISTCHURCH, NEW ZEALAND	NO	JTB0
11/26/1986	31	2								NO	JTB0
11/27/1986	31	2									JTB0
11/27/1986	424	1									JTB0
11/28/1986	32	1									JTB0
11/29/1986	77	1									JTB0
12/02/1986	72	1									JTB0
12/03/1986	32	1									JTB0
12/08/1986	34	1									JTB0
12/12/1986	35	2									JTB0
12/13/1986	36	1									JTB0
12/13/1986	37	2									JTB0
12/14/1986	37	2									JTB0
12/14/1986	40.										JTB0
14N14											JTB0

SOURCE: ENGINE MANUFACTURER

SOURCE: ENGINE MANUFACTURER

SOURCE : ENGINE MANUFACTURER

EDATE	ENG#	ENG POS	BIRD NAM	BIRD SPE #	BIRDS WI	OZ_1	CITY	PRS AIRPORT	LOCATE	US INCID	ENGINE DASH	
12/14/1986	80	2	GULL*	1			CHRISTCHURCH	NEW ZEALAND	NO	JT80	15	
12/14/1986	457	2	GULL*	1			SAN FRANCISCO, CA	NO	YES	CFM56	3	
12/15/1986	81		MALLARD	2J84	1	40.	MADRID, SPAIN	NO	NO	JT80		
12/17/1986	38	2					MISSOULA, MT	NO	YES	JT80		
12/19/1986	162	2					TRIVANDRUM, INDIA	NO	NO	JT80	9A	
12/20/1986	182	2					CHRISTCHURCH, NEW ZEALAND	NO	NO	JT80	15	
12/24/1986	58	1					BRAZIL	NO	NO	JT80	17A	
12/26/1986	237	2	HERRING GULL	14N14	1	40.	ORD-MSY	ORD	YES	JT80	7	
12/31/1986	242	2					CHICAGO, IL	HOUSTON, TEX	YES	CFM56	3	
01/02/1987	39	2					HOUSTON, TEX	FRESNO, CA	YES	JT80	17	
01/02/1987	43	1					MIYAKO JIMA, JAPAN	MIYAKO JIMA, JAPAN	NO	JT80		
01/04/1987	301						MELBOURNE, AUSTRALIA	NO	NO	CFM56	3	
01/04/1987	302						JAIPUR, INDIA	NO	NO	JT80		
01/07/1987	44						VARANASI, INDIA	NO	NO	JT80		
01/08/1987	83						MANCHESTER, ENGLAND	NO	NO	JT80		
01/09/1987	84	2					AUCKLAND, NEW ZEALAND	CHRISTCHURCH, NEW ZEALAND	NO	JT80		
01/09/1987	238	1					LAUNCESTON, TASMANIA	NO	NO	CFM56	3	
01/09/1987	303						SAN FRANCISCO, CA-OAKLAND	NO	YES	JT80	17	
01/09/1987	304						MUNICH, GERMANY	NO	NO	CFM56	3	
01/10/1987	45						RENO, NEV	YES	YES	CFM56	3	
01/16/1987	40	1	CROW*	17274	1	1.5	OAK-NR	OAK	NO	JT80	17	
01/17/1987	46	1	HORNED LARK				MUC	TRV	NO	CFM56	3	
01/17/1987	85						TRIVANDRUM, INDIA	NO	NO	JT80		
01/19/1987	41	2	CANADIAN GOOSE	2J30	2	128.	RNO-DEN	RNO		CFM56	3	
01/28/1987	47	1	GULL*				TG0	TGD	NO	CFM56	3	
01/28/1987	47	2	GULL*				TITROGRAD, YUGOSLAVIA	NO	NO	JT80		
02/08/1987	356						TITROGRAD, YUGOSLAVIA	NO	NO	JT80	17	
02/08/1987	340						SOUTH AFRICA	NO	NO	JT80	15	
02/10/1987	305						AUCKLAND, NEW ZEALAND	NO	NO	JT80		
02/10/1987	428	1					SAN JOSE, CA	YES	YES	JT80	9	
02/10/1987	429						SAN JOSE, CA	YES	YES	JT80	9	
02/10/1987	429						MIDWAY, ILL	NO	YES	JT80	15	
02/10/1987	458	2	GULL*				MIDWAY, ILL	NO	YES	JT80	15	
02/11/1987	458		GULL*				TRIVANDRUM, INDIA	NO	NO	JT80		
02/13/1987	85	2	GULL*				HAMBURG, GERMANY	NO	NO	CFM56	3	
02/13/1987	430						ARGENTINA, NY	NO	NO	JT80	9A	
02/14/1987	357	1					KAHULUI, MAUI, HAWAII	YES	YES	JT80	17A	
02/17/1987	359	1	GOLDEN PLOVER	5N25	1	6.	OGG-HNL	OGG	NO	CFM56	3	
02/19/1987	60	1		14N22	1	56.	DUR-PLZ	DUR	DURBAN, SOUTH AFRICA	NO	JT80	7
02/23/1987	61	2	GLAUCOUS WINGED GULL				PDX-RNO	PDX	PORTLAND, ORE	NO	JT80	15
02/25/1987	241	1					MUC	MUC	MUNICH, GERMANY	NO	JT80	
02/27/1987	649						ALB	STR	ALBANY, NY	YES	CFM56	3
02/28/1987	342	2	BLACK-BACKED GULL	14N21	1	31.	CHR	CHR	STUTTGART, GERMANY	NO	JT80	15
03/02/1987	706	1					CHRISTCHURCH	NEW ZEALAND	NO	JT80	15	
03/03/1987	460						SAN FRANCISCO, CA	NO	NO	CFM56	3	
03/10/1987	500	1	SHORE (HORNED) LARK	17274	1	1.5	DEN-OAK	OAK	TRIVANDRUM, INDIA	NO	JT80	17A
03/11/1987	358	2					PEK	PEK	BEIJING, CHINA	NO	CFM56	3
03/12/1987	358	1					ZRH	ZRH	SIDNEY, NSW, AUSTRALIA	NO	CFM56	3
03/13/1987	359	2					HSP	HSP	ST. PAUL, MINN	YES	CFM56	3
03/13/1987	63	1					LIHUE, KAUAI, HAWAII	NO	NO	JT80	9A	
03/14/1987	87						BAKODGRA, INDIA	NO	NO	JT80	15	
03/18/1987	64						BAHRAIN, BAHRAIN	NO	NO	JT80		
03/19/1987	88						JAI	JAI	JAIPUR, INDIA	NO	JT80	
03/19/1987	51						SYD	SYD	SIDNEY, NSW, AUSTRALIA	NO	CFM56	3
03/21/1987	52						ZRH	ZRH	ZURICH, SWITZERLAND	NO	CFM56	3
03/21/1987	53		DUCK OR GOOSE*				PIE-YYZ	PIE	ST. PETERSBURG, FL	YES	CFM56	3
03/21/1987	65		GULL*				PAT	PAT	PATNA, INDIA	NO	CFM56	3
03/21/1987	89								PAKISTAN	NO	CFM56	3
03/21/1987	90								MIYAKO JIMA, JAPAN	NO	CFM56	3
03/23/1987	54								JOHANNESBURG, S.W. AFRICA	NO	CFM56	3
03/25/1987	307	2							NAMIBIA, S.W. AFRICA	NO	CFM56	3
03/25/1987	66	1							FT LAUDERDALE/HOLLYWOOD, FL	YES	CFM56	3
03/26/1987	67								AUCKLAND, NEW ZEALAND	NO	CFM56	3
03/26/1987	91								GERMANY	NO	CFM56	3
03/28/1987	55								NICE, FRANCE	NO	CFM56	3
03/29/1987	92								DENVER, COL	YES	CFM56	3
03/29/1987	243										CFM56	3
03/30/1987	360										CFM56	3

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG	POS	DMG CODE	SEVERITY	POW LOSS	MAX VIBE	THROTTLE IF SD	REMARKS
12/14/1986	80	2	A,D		9	2	NO	PM EVENT	
12/14/1986	457	2	A,D		9	2	NO	ATB DUE TO WEATHER	
12/15/1986	81	2	A,D,H		2	NONE	NO		
12/17/1986	58	2	A,C		3	NONE	NO		
12/17/1986	162	2	A,C		3	NONE	NO		
12/19/1986	82	2	A,C		3	NONE	NO		
12/20/1986	58	1	A,C		3	NONE	NO		
12/24/1986	237	2	A,C		3	NONE	YES	#1 CMPT FIRE	
12/26/1986	42	2	A,D,F,I		1	NONE	NO		
12/31/1986	39	1	A,H		1	HIGH	NO		
12/31/1986	39	2	A,H		1	HIGH	NO		
01/02/1987	43	1	A,H		1	HIGH	NO		
01/04/1987	301	1	A,H		1	HIGH	NO		
01/07/1987	44	1	A,H		1	HIGH	NO		
01/08/1987	83	1	A,H		1	HIGH	NO		
01/09/1987	84	1	A,H		1	HIGH	NO		
01/09/1987	238	1	A,H		1	HIGH	NO		
01/09/1987	303	1	A,H		1	HIGH	NO		
01/09/1987	304	1	A,H		1	HIGH	NO		
01/10/1987	45	1	A,B		1	HIGH	NO		
01/16/1987	40	1	A,O		1	HIGH	NO		
01/17/1987	46	1	A,C,G,H		1	HIGH	NO		
01/19/1987	41	2	A,C,G,H		1	HIGH	NO		
01/28/1987	47	1	A,H		1	HIGH	NO		
01/28/1987	47	2	A,H		1	HIGH	NO		
02/06/1987	356	2	A,C		1	HIGH	NO		
02/10/1987	240	2	A,C		1	HIGH	NO		
02/10/1987	428	1	A,X		1	HIGH	NO		
02/10/1987	429	1	A,X		1	HIGH	NO		
02/10/1987	458	2	A		1	HIGH	NO		
02/11/1987	85	2	A		1	HIGH	NO		
02/13/1987	430	1	A,X		1	HIGH	NO		
02/17/1987	357	1	A,C		1	HIGH	NO		
02/19/1987	59	1	A,C,H		1	HIGH	NO		
02/19/1987	60	1	A,D,G		1	HIGH	NO		
02/23/1987	61	2	A,D,G		1	HIGH	NO		
02/25/1987	241	1	A,H		1	HIGH	NO		
02/27/1987	49	1	A,H		1	HIGH	NO		
02/28/1987	242	2	A,G		1	HIGH	NO		
03/02/1987	306	2	A,G		1	HIGH	NO		
03/03/1987	460	1	A,H		1	HIGH	NO		
03/10/1987	50	1	A,H		1	HIGH	NO		
03/11/1987	358	1	A,C		1	HIGH	NO		
03/12/1987	359	2	A,C		1	HIGH	NO		
03/13/1987	63	2	A,H		1	HIGH	NO		
03/16/1987	87	2	A,D,H		1	HIGH	NO		
03/17/1987	64	1	A,H		1	HIGH	NO		
03/18/1987	88	2	A,H		1	HIGH	NO		
03/19/1987	51	1	A,H		1	HIGH	NO		
03/21/1987	52	1	A,H		1	HIGH	NO		
03/21/1987	53	1	A,H		1	HIGH	NO		
03/21/1987	65	1	A,G		1	HIGH	NO		
03/21/1987	89	1	A,H		1	HIGH	NO		
03/21/1987	90	2	A,D,E		1	HIGH	NO		
03/23/1987	54	2	A,D,E		1	HIGH	NO		
03/25/1987	307	2	A,D,H		1	HIGH	CUTOFF	INVOLUNTARY RPM ROLLED BACK BELOW IDLE THEN SHUTDOWN	
03/26/1987	64	1	A,C		1	HIGH	NO		
03/27/1987	67	1	A,C		1	HIGH	NO		
03/28/1987	91	2	A,D		1	HIGH	NO		
03/29/1987	55	2	A,D,H		1	HIGH	NO		
03/29/1987	92	2	A,D,H		1	HIGH	NO		
03/29/1987	243	2	A,H		1	HIGH	NO		
03/30/1987	340	2	A,H		1	HIGH	NO		
03/30/1987	56	3	A,H		1	HIGH	NO		

SOURCE : ENGINE MANUFACTURER

DATE	EVT#	ENG	POS	ETIME	SIGN	EVI	AIRCRAFT	POF	ALTITUDE	SPEED	FL	RULES	LT	COND'S	WEATHER	CREW	AC	CREW AL	BIRD SEE
03/30/1987	308	2					UNKNOWN	TAKEOFF	200	0	90			CLEAR	ATO	ATO	NO	FLOCK	
03/31/1987	425	2					NONE	MULT BIRDS	200	0	40			SCATTERED	ATO	ATO	NO	SEVERAL	
04/01/1987	68	2		14:10:00			9:00:00	NONE	200					SCATTERED	NO	NO	YES		
04/03/1987	244	2					23:59:00	NONE	200										
04/05/1987	309	2					NONE	NONE	200										
04/07/1987	245	2					19:40:00	NONE	200										
04/09/1987	93	2					22:30:00	NONE	300	0	160	I FR		DARK	CLEAR	DIV	NO	SEVERAL	
04/11/1987	361	1					NONE	NONE	300	0	140	I FR		CLEAR	CLEAR	NON	YES		
04/12/1987	106	1					NONE	NONE	300	0	140	I FR		SCATTERED	SCATTERED	NON	YES		
04/14/1987	107	1					NONE	NONE	200	0	140	I FR							
04/16/1987	246	2					MULT BIRDS	NONE	200										
04/17/1987	108	1					NONE	NONE	300										
04/19/1987	109	2					NONE	NONE	300										
04/21/1987	70	1					TRVS FRAC	NONE	200	0	130			0	130	ATB	NO	NO	
04/22/1987	247	2					NONE	NONE	200										
04/23/1987	248	2					NONE	NONE	200										
04/26/1987	510	2					NONE	NONE	200										
05/01/1987	312	1					NONE	NONE	200										
05/01/1987	362	1					NONE	NONE	200										
05/03/1987	69	2					NONE	NONE	200										
05/04/1987	110	1					NONE	NONE	200										
05/10/1987	194	1					NONE	NONE	200										
05/12/1987	95	1					NONE	NONE	200										
05/12/1987	363	1					NONE	NONE	200										
05/17/1987	313	2					NONE	NONE	200										
05/18/1987	249	1					NONE	NONE	200										
05/20/1987	250	2					13:40:00	MULT BIRDS	200										
05/22/1987	96	1					:17:00	MULT BIRDS	200										
05/22/1987	97	1					NONE	NONE	200										
05/24/1987	98	1					NONE	NONE	200										
05/24/1987	99	1					7:35:00	TRVS FRAC	200										
05/24/1987	251	2					6:30:00	NONE	200										
05/25/1987	252	2					8:53:00	NONE	200										
05/26/1987	252	1					16:00:00	NONE	200										
05/27/1987	254	2					NONE	NONE	200										
05/28/1987	100	2					NONE	NONE	200										
05/28/1987	165	1					NONE	NONE	200										
05/29/1987	253	2					NONE	NONE	200										
05/30/1987	164	2					10:50:00	NONE	200										
05/31/1987	254	1					14:55:00	NONE	200										
05/31/1987	71	1					17:06:00	NONE	200										
06/02/1987	71	1					16:05:00	NONE	200										
06/03/1987	315	1					NONE	NONE	200										
06/04/1987	315	1					14:45:00	NONE	200										
06/05/1987	112	2					NONE	NONE	300										
06/06/1987	253	2					NONE	NONE	300										
06/06/1987	113	2					20:20:00	NONE	300										
06/06/1987	117	1					16:10:00	NONE	300										
06/06/13/1987	256	2					4:03:00	MULT ENG	200										
06/06/13/1987	365	1					NONE	NONE	200										
06/06/14/1987	316	1					NONE	NONE	200										
06/06/15/1987	257	2					16:45:00	NONE	200										
06/06/17/1987	118	2					NONE	NONE	200										
06/06/17/1987	317	2					NONE	NONE	200										
06/06/19/1987	119	1					9:09:00	NONE	300										
06/06/22/1987	166	1					15:45:00	1:JNE	300										
06/06/22/1987	258	1					NONE	NONE	200										
06/06/25/1987	102	2					12:56:00	NONE	200										
06/06/27/1987	103	1					NONE	NONE	200										
06/06/27/1987	259	1					10:07:00	NONE	200										
06/06/27/1987	318	2					15:18:00	MULT BIRDS	200										
06/06/29/1987	427	1					NONE	NONE	200										
06/07/02/1987	260	1					14:15:00	NONE	200										

SOURCE: ENGINE MANUFACTURER

DATE	EV#	ENG	POS	BIRD	MAN	BIRD	SPE	# BIRDS	WT	02	1	CITY	PRS	AIRPORT	LOCATE	US	INC'D	ENGINE	DASH
03/30/1987	308	2	425	2	SWALLOW*	AKL	PLZ-LON	PLZ	FRA	CHRISTCHURCH	NEW ZEALAND	NO	JTB80	17A					
04/01/1987	68	2	244	2	COMMON BLACKBIRD	412269	1	2.8	CHC	KUCHING	AFRICA	YES	JTB80						
04/03/1987	309	2	245	2					CCU	CALCUTTA	GERMANY	NO	JTB80						
04/05/1987	93	2	106	1					CPH	ZAIRE	NEW ZEALAND	NO	JTB80	17					
04/07/1987	361		107	1					SYD-MEL	COLOGNE	MALAYSIA	NO	JTB80	15					
04/09/1987	106	1	108	2					STP	SYDNEY	AUSTRALIA	NO	CFM56	3					
04/11/1987	109	2	246	2	AMERICAN KESTREL	SK26	2	4.	THA	ZAKI THOS	FRANKFURT	NO	JTB80	3					
04/12/1987	70	1	247		ROCK DOVE	2P1	1	14.	FRA	DAI	GERMANY	NO	CFM56	3					
04/23/1987	248	2	310	2					PEN	DALLAS/FT. WORTH	TEXAS	YES	JTB80	3					
04/26/1987	311	2	312	1					MAN	MALAYSIA	TEXAS	NO	JTB80						
05/01/1987	312	1	362						-CHC	MANCHESTER	ENGLAND	NO	JTB80						
05/03/1987	69	2	69	2					MLG-IND	WLG	WELLINGTON	NO	JTB80						
05/04/1987	110	2	110	1					-AKL	AUCKLAND	NEW ZEALAND	NO	JTB80						
05/10/1987	94	1	111	2					PIE-YZZ	CHRISTCHURCH	NEW ZEALAND	NO	JTB80	15A					
05/12/1987	95	1	249	1					PIE-SAT	FL	NSW	NO	JTB80	9A					
05/16/1987	363	1	364	2					SAT-HOU	SAN ANTONIO	AUSTRALIA	YES	CFM56	3					
05/17/1987	364	2	313	2					SAT-JRN	TEX	GERMANY	NO	JTB80						
05/22/1987	96	1	250	2					LIT-HOU	JORHAT	INDIA	NO	CFM56	3					
05/22/1987	97	1	97	1					LIT-BOM	LITTLE ROCK	INDIA	YES	JTB80						
05/22/1987	98	1	100	2					BLR-VNS	BOMBAY	ARK	NO	CFM56	3					
05/24/1987	99	1	101	2					ENGLAND	INDIA	ENGLAND	NO	JTB80						
05/25/1987	251	2	251	2					CHRISTCHURCH	CHRISTCHURCH	NEW ZEALAND	NO	JTB80	15A					
05/25/1987	252	1	252	1					CHRISTCHURCH	ENGLAND	HEATHROW	NO	JTB80	15					
05/26/1987	96	1	252	1					CHRISTCHURCH	ALOR SETAR	NEW ZEALAND	NO	JTB80	15					
05/27/1987	97	1	254	1					CHRISTCHURCH	BANGALORE	INDIA	NO	JTB80						
05/28/1987	98	1	100	2					CHRISTCHURCH	VARAMASI	INDIA	NO	JTB80						
05/28/1987	99	1	101	2					CHRISTCHURCH	KUALA LUMPUR	INDIA	NO	JTB80						
05/29/1987	100	2	100	2					CHRISTCHURCH	MALAYSIA	INDIA	NO	JTB80						
05/29/1987	101	1	101	2					CHRISTCHURCH	VARANASI	INDIA	NO	JTB80						
05/30/1987	112	2	112	2					CHRISTCHURCH	EAST LONDON	INDIA	NO	JTB80	15					
05/31/1987	113	2	253	2					CHRISTCHURCH	COLON	INDIA	NO	JTB80	15					
06/01/1987	254	1	254	1					CHRISTCHURCH	BONN	INDIA	NO	JTB80	15					
06/02/1987	71	1	71	1					CHRISTCHURCH	KUALA LUMPUR	INDIA	NO	JTB80	15					
06/03/1987	315	1	315	1					CHRISTCHURCH	MALAYSIA	INDIA	NO	JTB80	15A					
06/04/1987	103	1	114	2					CHRISTCHURCH	CHRISTCHURCH	NEW ZEALAND	NO	CFM56	3					
06/05/1987	115	2	115	2					CHRISTCHURCH	NETHERLANDS	NEW ZEALAND	NO	CFM56	3					
06/06/1987	116	1	116	1					CHRISTCHURCH	ALGIERS	NETHERLANDS	NO	CFM56	3					
06/06/1987	117	1	117	2					CHRISTCHURCH	TANGER	NETHERLANDS	NO	CFM56	3					
06/07/1987	118	2	255	1					CHRISTCHURCH	MOROCCO	NETHERLANDS	NO	CFM56	3					
06/08/1987	256	2	256	2					CHRISTCHURCH	DUBLIN	NETHERLANDS	NO	CFM56	3					
06/09/1987	365	2	316	1					CHRISTCHURCH	NORFOLK	NETHERLANDS	NO	CFM56	3					
06/10/1987	257	2	257	2					CHRISTCHURCH	VA	NETHERLANDS	NO	CFM56	3					
06/11/1987	258	1	317	2					CHRISTCHURCH	MIYAKO JIMA	NETHERLANDS	NO	CFM56	3					
06/12/1987	259	1	114	2					CHRISTCHURCH	KOS	NETHERLANDS	NO	CFM56	3					
06/13/1987	260	1	115	2					CHRISTCHURCH	GREECE	NETHERLANDS	NO	CFM56	3					
06/14/1987	261	2	115	2					CHRISTCHURCH	GRAZ	NETHERLANDS	NO	CFM56	3					
06/15/1987	262	1	116	1					CHRISTCHURCH	SALT LAKE CITY	NETHERLANDS	NO	CFM56	3					
06/16/1987	263	2	254	1					CHRISTCHURCH	LOURDES	NETHERLANDS	NO	CFM56	3					
06/17/1987	264	1	254	1					CHRISTCHURCH	FRANCE	NETHERLANDS	NO	CFM56	3					
06/18/1987	265	1	255	1					CHRISTCHURCH	EDMONTON	NETHERLANDS	NO	CFM56	3					
06/19/1987	266	1	266	1					CHRISTCHURCH	ALTA MUN., CANADA	NETHERLANDS	NO	CFM56	3					
06/20/1987	267	1	267	1					CHRISTCHURCH	LINZ	NETHERLANDS	NO	CFM56	3					
06/21/1987	268	1	268	1					CHRISTCHURCH	MILAN	NETHERLANDS	NO	CFM56	3					
06/22/1987	269	1	269	1					CHRISTCHURCH	MILAN	NETHERLANDS	NO	CFM56	3					
06/23/1987	270	1	270	1					CHRISTCHURCH	WASHINGT	NETHERLANDS	NO	CFM56	3					
06/24/1987	271	1	271	1					CHRISTCHURCH	DC-DULLES	NETHERLANDS	NO	CFM56	3					
06/25/1987	272	1	272	1					CHRISTCHURCH	HARLINGEN	NETHERLANDS	NO	CFM56	3					
06/26/1987	273	1	273	1					CHRISTCHURCH	TEX	NETHERLANDS	NO	CFM56	3					
06/27/1987	274	1	274	1					CHRISTCHURCH	FRANKFURT	NETHERLANDS	NO	CFM56	3					
06/28/1987	275	1	275	1					CHRISTCHURCH	PARIS	NETHERLANDS	NO	CFM56	3					
06/29/1987	276	1	276	1					CHRISTCHURCH	SPAIN	NETHERLANDS	NO	CFM56	3					
06/30/1987	277	1	277	1					CHRISTCHURCH	FRANC	NETHERLANDS	NO	CFM56	3					
06/31/1987	278	1	278	1					CHRISTCHURCH	CA-OAKLAND	NETHERLANDS	NO	CFM56	3					
07/01/1987	279	1	279	1					CHRISTCHURCH	TAIWAN	NETHERLANDS	NO	CFM56	3					
07/02/1987	280	1	280	1					CHRISTCHURCH	TUNISIA	NETHERLANDS	NO	CFM56	3					
07/03/1987	281	1	281	1					CHRISTCHURCH	CHRISTCHURCH	NETHERLANDS	NO	CFM56	3					
07/04/1987	282	1	282	1					CHRISTCHURCH	DAYTON	NETHERLANDS	NO	CFM56	3					
07/05/1987	283	1	283	1					CHRISTCHURCH	RED TAIL	NETHERLANDS	NO	CFM56	3					
07/06/1987	284	1	284	1					CHRISTCHURCH	LONDON	NETHERLANDS	NO	CFM56	3					
07/07/1987	285	1	285	1					CHRISTCHURCH	HEATHROW	NETHERLANDS	NO	CFM56	3					
07/08/1987	286	1	286	1					CHRISTCHURCH	PARIS	NETHERLANDS	NO	CFM56	3					
07/09/1987	287	1	287	1					CHRISTCHURCH	FRANC	NETHERLANDS	NO	CFM56	3					
07/10/1987	288	1	288	1					CHRISTCHURCH	SPAIN	NETHERLANDS	NO	CFM56	3					
07/11/1987	289	1	289	1					CHRISTCHURCH	CA-OAKLAND	NETHERLANDS	NO	CFM56	3					
07/12/1987	290	1	290	1					CHRISTCHURCH	TAIWAN	NETHERLANDS	NO	CFM56	3					
07/13/1987	291	1	291	1					CHRISTCHURCH	TUNISIA	NETHERLANDS	NO	CFM56	3					
07/14/1987	292	1	292	1					CHRISTCHURCH	CHRISTCHURCH	NETHERLANDS	NO	CFM56	3					
07/15/1987	293	1	293	1					CHRISTCHURCH	DAYTON	NETHERLANDS	NO	CFM56	3					
07/16/1987	294	1	294	1					CHRISTCHURCH	RED TAIL	NETHERLANDS	NO	CFM56	3					
07/17/1987	295	1	295	1					CHRISTCHURCH	LONDON	NETHERLANDS	NO	CFM56	3					
07/18/1987	296	1	296	1					CHRISTCHURCH	HEATHROW	NETHERLANDS	NO	CFM56	3					
07/19/1987	297	1	297	1					CHRISTCHURCH	PARIS	NETHERLANDS	NO	CFM56	3					
07/20/1987	298	1	298	1					CHRISTCHURCH	SPAIN	NETHERLANDS	NO	CFM56	3					
07/21/1987	299	1	299	1					CHRISTCHURCH	CA-OAKLAND	NETHERLANDS	NO	CFM56	3					
07/22/1987	300	1	300	1					CHRISTCHURCH	TAIWAN	NETHERLANDS	NO	CFM56	3					
07/23/1987	301																		

SOURCE: ENGINE MANUFACTURER

DATE	EV#	ENG	POS	DMG CODE	SEVERITY	PW LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
03/30/1987	308	2			9	9	9	9	9	
03/31/1987	425	2			9	9	9	9	9	
04/01/1987	68	2			9	9	9	9	9	
04/03/1987	244	2			9	9	9	9	9	
04/05/1987	309	2			9	9	9	9	9	
04/07/1987	245	2			9	9	9	9	9	
04/07/1987	93	2			9	9	9	9	9	
04/07/1987	361	1			9	9	9	9	9	
04/09/1987	106	1			9	9	9	9	9	
04/12/1987	107	1			9	9	9	9	9	
04/14/1987	246	2			9	9	9	9	9	
04/14/1987	108	1			9	9	9	9	9	
04/17/1987	109	2			9	9	9	9	9	
04/21/1987	70	1			9	9	9	9	9	
04/22/1987	247	2			9	9	9	9	9	
04/23/1987	248	2			9	9	9	9	9	
04/26/1987	311	2			9	9	9	9	9	
04/26/1987	312	1			9	9	9	9	9	
05/01/1987	A,G				9	9	9	9	9	
05/03/1987	COMPRESSOR				9	9	9	9	9	
05/04/1987	NONE				9	9	9	9	9	
05/10/1987	A,H				9	9	9	9	9	
05/10/1987	NONE				9	9	9	9	9	
05/12/1987	A,C				9	9	9	9	9	
05/17/1987	363	2			9	9	9	9	9	
05/18/1987	364	2			9	9	9	9	9	
05/20/1987	250	2			9	9	9	9	9	
05/22/1987	A,H				9	9	9	9	9	
05/22/1987	COMPRESSOR				9	9	9	9	9	
05/24/1987	NONE				9	9	9	9	9	
05/24/1987	A,I,K,N				9	9	9	9	9	
05/25/1987	99	2			9	9	9	9	9	
05/26/1987	164	2			9	9	9	9	9	
05/27/1987	A,H				9	9	9	9	9	
05/28/1987	254	2			9	9	9	9	9	
05/28/1987	314	2			9	9	9	9	9	
05/29/1987	A,D				9	9	9	9	9	
05/30/1987	253	2			9	9	9	9	9	
05/31/1987	A,D				9	9	9	9	9	
06/01/1987	A,H				9	9	9	9	9	
06/02/1987	254	2			9	9	9	9	9	
06/03/1987	A,D				9	9	9	9	9	
06/04/1987	A,H				9	9	9	9	9	
06/05/1987	165	2			9	9	9	9	9	
06/05/1987	A,B				9	9	9	9	9	
06/09/1987	255	2			9	9	9	9	9	
06/10/1987	A,H				9	9	9	9	9	
06/13/1987	166	2			9	9	9	9	9	
06/13/1987	A,C				9	9	9	9	9	
06/17/1987	256	2			9	9	9	9	9	
06/17/1987	A,G				9	9	9	9	9	
06/22/1987	167	2			9	9	9	9	9	
06/22/1987	A,C				9	9	9	9	9	
06/25/1987	258	1			9	9	9	9	9	
06/27/1987	A,G				9	9	9	9	9	
06/27/1987	318	2			9	9	9	9	9	
06/29/1987	A,C				9	9	9	9	9	
07/02/1987	427	1			9	9	9	9	9	

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	ETIME	SIGN_EVT	AIRCRAFT_POF	ALTITUDE	SPEED_FL	RULES_LT	CONDOS	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
07/02/1987	366			NONE	UNKNOWN	200				ATB	NO		
07/02/1987	431			NONE	UNKNOWN	300				SCATTERED	NONE		
07/03/1987	319	1	15:15:00	NONE	TAKEOFF	200				CLEAR	NO		
07/04/1987	261	2	8:25:00	NONE	LANDING	200	+V1						
07/05/1987	133	2		NONE	TAKEOFF	300							
07/06/1987	134	2		NONE	UNKNOWN	300							
07/07/1987	104	2		NONE	UNKNOWN	200							
07/08/1987	1064	1	0:42:00	NONE	TAKEOFF	0	0				ATO	NO	YES
07/09/1987	135	2	12:20:00	NONE	LANDING	300					NONE	NO	NO
07/11/1987	262	1		NONE	CLIMB	3000	170			SCATTERED	NONE	NO	NO
07/12/1987	105	1		NONE	UNKNOWN	200					NONE	NO	NO
07/13/1987	171	2		NONE	UNKNOWN	200					NONE	NO	NO
07/14/1987	1061	2		NONE	LANDING	200					NONE	NO	NO
07/15/1987	1062	1		NONE	UNKNOWN	200					NONE	NO	NO
07/16/1987	1063	1		NONE	UNKNOWN	200					NONE	NO	NO
07/17/1987	320	1		NONE	CLIMB	1000	155				ONE		
07/18/1987	367			NONE	APPROACH	300	130				SEVERAL		
07/19/1987	432			NONE	UNKNOWN	300							
07/19/1987	139	2	20:26:00	MULT_BIRDS	TAKEOFF	100	0	+V1				NO	NO
07/19/1987	264	2	7:00:00	NONE	TAKEOFF	300	0					NO	YES
07/20/1987	140	2	15:20:00	NONE	APPROACH	200	100	125				NO	FLOCK
07/21/1987	1265	2		NONE	TAKEOFF	200	TAKEOFF	0					
07/21/1987	426	2		NONE	TAKEOFF	200	TAKEOFF	0					
07/21/1987	1226	2		NONE	TAKEOFF	200	TAKEOFF	0					
07/22/1987	122	2	19:00:00	NONE	TAKEOFF	200	TAKEOFF	0					
07/23/1987	1223	1	18:37:00	NONE	TAKEOFF	200	TAKEOFF	0					
07/24/1987	124	2	9:00:00	NONE	TAKEOFF	200	TAKEOFF	0					
07/25/1987	141	2		NONE	TAKEOFF	200	TAKEOFF	0					
07/26/1987	266	1	20:37:00	NONE	TAKEOFF	200	TAKEOFF	0					
07/27/1987	321	1		NONE	TAKEOFF	200	TAKEOFF	0					
07/28/1987	1065	1	17:45:00	NONE	TAKEOFF	200	TAKEOFF	0					
07/29/1987	142	1		NONE	TAKEOFF	200	TAKEOFF	0					
07/29/1987	368	2		NONE	TAKEOFF	200	TAKEOFF	0					
07/30/1987	127	1	4:55:00	NONE	TAKEOFF	200	TAKEOFF	0					
07/30/1987	322			NONE	TAKEOFF	200	TAKEOFF	0					
07/31/1987	143	1	9:55:00	MULT_BIRDS	TAKEOFF	300	500	+V1				NO	NO
08/01/1987	128	1		NONE	TAKEOFF	200	TAKEOFF	0				NO	YES
08/02/1987	129	2		NONE	TAKEOFF	200	TAKEOFF	0					
08/03/1987	1205	2		NONE	TAKEOFF	200	TAKEOFF	0					
08/03/1987	205	2		NONE	TAKEOFF	200	TAKEOFF	0					
08/03/1987	267	2		MULT_BIRDS	TAKEOFF	200	TAKEOFF	0					
08/03/1987	369	1		NONE	TAKEOFF	200	TAKEOFF	0					
08/04/1987	1269	1	0:00:00	NONE	TAKEOFF	200	TAKEOFF	0					
08/04/1987	323	2		NONE	TAKEOFF	200	TAKEOFF	0					
08/04/1987	145	1		NONE	TAKEOFF	200	TAKEOFF	0					
08/05/1987	146	1		MULT_ENG	TAKEOFF	300	TAKEOFF	0					
08/05/1987	207	1		NONE	TAKEOFF	200	TAKEOFF	0					
08/05/1987	370			NONE	TAKEOFF	200	TAKEOFF	0					
08/06/1987	1068	1	9:54:00	NONE	TAKEOFF	200	TAKEOFF	0					
08/06/1987	147	1	15:30:00	NONE	TAKEOFF	300	TAKEOFF	20	135			ONE	NO
08/07/1987	1068	1	15:17:00	MULT_BIRDS	TAKEOFF	200	TAKEOFF	0	85			YES	
08/08/1987	1069	1	0:00:00	NONE	TAKEOFF	200	TAKEOFF	0	60			ATO	

SOURCE: ENGINE MANUFACTURER

SOURCE : ENGINE MANUFACTURER	EDATE	EVN#	ENG	POS	DNG_CODE	SEVERITY	PW LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
	07/02/1987	366				9	9	9	9	9	NO
	07/02/1987	431				9	9	9	9	9	NO
	07/03/1987	319	1			9	9	9	9	9	NO
	07/04/1987	261	2			9	9	9	9	9	NO
	07/05/1987	133	2			9	9	9	9	9	NO
	07/06/1987	134	2		A,C	9	9	9	9	9	REPLACED 1 PAIR OF F BLDS
	07/07/1987	1064	1			9	9	9	9	9	NO
	07/09/1987	135	2		A,G,N	9	9	9	9	9	NO
	07/11/1987	1061	1		A,D,N	9	9	9	9	9	NO
	07/13/1987	1062	1		A	9	9	9	9	9	NO
	07/14/1987	136	2			9	9	9	9	9	NO
	07/14/1987	137	1			9	9	9	9	9	NO
	07/14/1987	138	1			9	9	9	9	9	NO
	07/15/1987	263	1			9	9	9	9	9	NO
	07/15/1987	1063	1			9	9	9	9	9	NO
	07/16/1987	320	1			9	9	9	9	9	NO
	07/17/1987	367	1			9	9	9	9	9	NO
	07/17/1987	432	1		A	9	9	9	9	9	NO
	07/19/1987	139	2			9	9	9	9	9	NO
	07/21/1987	264	1		A,D	9	9	9	9	9	NO
	07/21/1987	140	1			9	9	9	9	9	NO
	07/21/1987	265	1		A,C,H,N	9	9	9	9	9	NO
	07/23/1987	426	1		A,B,G,H	9	9	9	9	9	NO
	07/23/1987	123	1		EPR DEC	9	9	9	9	9	NO
	07/26/1987	124	1		COMPRESSOR	9	9	9	9	9	YES
	07/26/1987	141	1		HONEY	9	9	9	9	9	NO
	07/26/1987	266	1			9	9	9	9	9	NO
	07/27/1987	321	1			9	9	9	9	9	NO
	07/27/1987	1065	1		A,G,H	9	9	9	9	9	NO
	07/27/1987	126	1			9	9	9	9	9	NO
	07/28/1987	142	2			9	9	9	9	9	NO
	07/29/1987	368	2		A,C,G,K	9	9	9	9	9	CUTOFF
	07/30/1987	127	1		A,C,G,K	9	9	9	9	9	EPR
	07/31/1987	322	1		A,B,D,H	9	9	9	9	9	CUTTOFF
	07/31/1987	143	1			9	9	9	9	9	STRONG ODOR IN CABIN
	08/03/1987	144	1			9	9	9	9	9	STRONG ODOR IN CABIN
	08/03/1987	128	2			9	9	9	9	9	#2 ENGINE STALLED AT 80 KTS, PM EVENT
	08/03/1987	205	2			9	9	9	9	9	TIRE FAILURE
	08/03/1987	267	1			9	9	9	9	9	EVENT OCCURRED 1N PM
	08/03/1987	369	1			9	9	9	9	9	
	08/04/1987	206	1			9	9	9	9	9	
	08/04/1987	323	1			9	9	9	9	9	
	08/05/1987	145	1			9	9	9	9	9	
	08/05/1987	146	1			9	9	9	9	9	
	08/05/1987	207	1			9	9	9	9	9	
	08/05/1987	370	1			9	9	9	9	9	
	08/06/1987	147	1			9	9	9	9	9	
	08/06/1987	1067	1			9	9	9	9	9	
	08/06/1987	1068	1			9	9	9	9	9	
	08/06/1987	1066	1			9	9	9	9	9	
	08/06/1987	208	2			9	9	9	9	9	
	08/06/1987	433	2			9	9	9	9	9	
	08/07/1987	130	2			9	9	9	9	9	
	08/07/1987	148	1			9	9	9	9	9	
	08/08/1987	131	1			9	9	9	9	9	
	08/08/1987	209	1			9	9	9	9	9	
	08/08/1987	324	1			9	9	9	9	9	
	08/22/1987	372	1			9	9	9	9	9	
	08/22/1987	1070	2			9	9	9	9	9	

SOURCE : ENGINE MANUFACTURER

E DATE	EVT#	ENG	POS	ETIME	SIGN_EVT	AIRCRAFT_POF	POF	ALTIITUDE	SPEED	FL_RULES	L1_COND	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
08/22/1987	1071	1			NONE	200	APPROACH	NONE							
08/23/1987	373	2			NONE	200	TAKEOFF								YES
08/25/1987	210	2			NONE	200	UNKNOWN								YES
08/26/1987	188	1		8:23:00	TRVS FRAC	200	LANDING	0	140	VFR	NIGHT	SCATTERED	ATO	NO	NO
08/26/1987	374				NONE	200	TAKEOFF	0	+V1						SEVERAL
08/28/1987	451				NONE	200	TAKEOFF	0	130						YES
08/29/1987	325	1		16:15:00	MULT BIRDS	200	TAKEOFF	0							YES
08/29/1987	211	2			MULT BIRDS	200	TAKEOFF	0							
08/29/1987	268				MULT BIRDS	200	TAKEOFF	0							
08/30/1987	326				MULT BIRDS	200	TAKEOFF	0	80						
08/30/1987	1072				MULT BIRDS	200	TAKEOFF	0							
08/31/1987	149				MULT BIRDS	200	TAKEOFF	0							
08/31/1987	150	2			MULT BIRDS	200	TAKEOFF	0							
08/31/1987	151	2			MULT BIRDS	200	TAKEOFF	0							
09/01/1987	269	1		8:06:00	NONE	200	TAKEOFF	0	100	VFR					ONE FLOCK
09/01/1987	327	1			NONE	200	TAKEOFF	0	155	VFR					ONE ONE
09/02/1987	328	1		6:57:00	NONE	200	TAKEOFF	15							
09/02/1987	375	1		10:15:00	NONE	200	TAKEOFF	0							
09/06/1987	132	2			NONE	200	TAKEOFF	15							
09/06/1987	152	1			NONE	200	TAKEOFF	0							
09/07/1987	329	1			NONE	200	TAKEOFF	15							
09/08/1987	329	1			NONE	200	TAKEOFF	0							
09/08/1987	449	2			NONE	200	TAKEOFF	15							
09/08/1987	1073	2			NONE	200	TAKEOFF	0							
09/09/1987	330	2			NONE	200	TAKEOFF	15							
09/09/1987	350	1			NONE	200	TAKEOFF	0							
09/10/1987	153	1		6:25:00	NONE	200	TAKEOFF	0	100	I FR	BRIGHT	CLEAR	ATB	NO	ONE
09/10/1987	434	2			NONE	200	TAKEOFF	0	100	VFR	BRIGHT	CLEAR	ATB	NO	ONE
09/12/1987	212	2		17:40:00	NONE	200	TAKEOFF	0	110	VFR	BRIGHT	CLOUDY	ATB	NO	SEVERAL
09/12/1987	270	1			NONE	200	TAKEOFF	0	110	VFR	BRIGHT	CLOUDY	ATB	NO	FLOCK
09/13/1987	154	1			NONE	200	TAKEOFF	0	110	VFR	BRIGHT	CLOUDY	ATB	NO	ONE NO
09/13/1987	154	2			NONE	200	TAKEOFF	0	110	VFR	BRIGHT	CLOUDY	ATB	NO	SEVERAL
09/14/1987	155	1		9:06:00	NONE	200	TAKEOFF	0	100	I FR	BRIGHT	CLEAR	ATB	NO	NO
09/14/1987	376	1			NONE	200	TAKEOFF	0	100	VFR	BRIGHT	CLEAR	ATB	NO	
09/15/1987	155	2		13:33:00	NONE	200	TAKEOFF	0	100	VFR	BRIGHT	CLOUDY	ATB	NO	
09/15/1987	155	1			NONE	200	TAKEOFF	0	100	VFR	BRIGHT	CLOUDY	ATB	NO	
09/16/1987	156	1		7:55:00	MULT BIRDS	200	TAKEOFF	0	100	VFR	BRIGHT	CLOUDY	ATB	NO	
09/16/1987	377	1			MULT BIRDS	200	TAKEOFF	0	100	VFR	BRIGHT	CLOUDY	ATB	NO	
09/16/1987	1074	1			MULT BIRDS	200	TAKEOFF	0	100	VFR	BRIGHT	CLOUDY	ATB	NO	
09/17/1987	157	1		18:45:00	NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	SEVERAL
09/17/1987	271	2			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	NO
09/17/1987	331	2			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	NO
09/18/1987	158	1			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/18/1987	167	2			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/18/1987	379	2			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/18/1987	1075	1			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/20/1987	332	2			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/22/1987	159	2		0:43:00	NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/22/1987	169	2		9:57:00	NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/22/1987	272	2			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/23/1987	1076	2		19:20:00	NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/23/1987	160	2			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/23/1987	450	2			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/24/1987	380	1			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/24/1987	1077	2			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/24/1987	333	2			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/25/1987	334	2		17:23:00	NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/25/1987	170	2			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/29/1987	173	2			NONE	200	TAKEOFF	0	150	VFR	DARK	CLEAR	ATB	NO	
09/30/1987	204	1		19:36:00	NONE	200	TAKEOFF	10	145	VFR	CLEAR	CLOUDY	ATB	NO	
10/01/1987	189	1			NONE	200	TAKEOFF	10	145	VFR	CLEAR	CLOUDY	ATB	NO	
10/01/1987	213	2			NONE	200	TAKEOFF	10	145	VFR	CLEAR	CLOUDY	ATB	NO	
10/02/1987	213	2			NONE	200	TAKEOFF	10	145	VFR	CLEAR	CLOUDY	ATB	NO	
10/02/1987	335	1			NONE	200	TAKEOFF	10	145	VFR	CLEAR	CLOUDY	ATB	NO	
10/05/1987	336	1			NONE	200	TAKEOFF	10	145	VFR	CLEAR	CLOUDY	ATB	NO	
10/06/1987	381	1			NONE	200	TAKEOFF	10	145	VFR	CLEAR	CLOUDY	ATB	NO	
10/06/1987	190	2			NONE	200	TAKEOFF	10	145	VFR	CLEAR	CLOUDY	ATB	NO	
10/06/1987	337	1			NONE	200	TAKEOFF	10	145	VFR	CLEAR	CLOUDY	ATB	NO	
10/06/1987	338	1			NONE	200	TAKEOFF	10	145	VFR	CLEAR	CLOUDY	ATB	NO	
10/08/1987	382	2			NONE	200	TAKEOFF	10	145	VFR	CLEAR	CLOUDY	ATB	NO	
10/08/1987	1078	2			NONE	200	TAKEOFF	10	145	VFR	CLEAR	CLOUDY	ATB	NO	
10/08/1987	1078	2			NONE	200	TAKEOFF	10	145	VFR	CLEAR	CLOUDY	ATB	NO	
10/10/1987	383	2		10:30:00	NONE	200	TAKEOFF	10	145	VFR	CLEAR	CLOUDY	ATB	NO	YES

SOURCE: ENGINE MANUFACTURER

SOURCE : ENGINE MANUFACTURER	EVT#	ENG	DMG CODE	SEVERITY	PW LOSS	MAX VIBE THROTTLE IFSD	REMARKS
	08/22/1987	1071	1	9	9	9	NO
	08/23/1987	373	2	9	9	9	1, 1ST STAGE F BLADES WERE FRAC, 2nd DAM
	08/25/1987	210	2	A,C,G,I	NONE	9	PM EVENT, LOUD ENGINE NOISE
	08/26/1987	188	1				
	08/26/1987	374					
	08/26/1987	451					
	08/28/1987	325	A,C	YES			SYMPTOM - VIBRATION
	08/29/1987	268		YES			3 F BLDS BENT, DROP IN EPR
	08/29/1987	326					FOUND DURING GROUND INSPECTION
	08/30/1987	1072	A,C	NONE	2		3 FAN BLADES DAMAGED
	08/31/1987	149	A	NONE	NO		1 FAN BLADE DAMAGED
	08/31/1987	150	A	NONE	NO		
	08/31/1987	327					
	08/31/1987	269	A,H				
	09/01/1987	327	A,C				
	09/02/1987	328	A,X				
	09/03/1987	375					
	09/04/1987	375	A,X				
	09/05/1987	132					
	09/06/1987	152					
	09/07/1987	329					
	09/08/1987	449					
	09/09/1987	1073					
	09/10/1987	153					
	09/10/1987	330					
	09/10/1987	270					
	09/12/1987	212	A,H	NONE	2		MEDIUM BIRD
	09/12/1987	172	A,B,N	NONE			4 FAN MID ACOUSTICAL PANELS REPLACED
	09/13/1987	154	A,C	NONE			
	09/13/1987	172	A,C	NONE			
	09/14/1987	155	A,C	NONE			
	09/14/1987	376	A,C	NONE			
	09/15/1987	376	A,C	NONE			
	09/16/1987	156	A,C	NONE			
	09/16/1987	377	A,C	NONE			
	09/16/1987	1074	A,G	NONE			
	09/17/1987	157	A,C	NONE			
	09/17/1987	271	A,C	NONE			
	09/17/1987	331	A,C	NONE			
	09/18/1987	358	A,C	NONE			
	09/18/1987	167	A,C	NONE			
	09/18/1987	379	A,G	NONE			
	09/18/1987	167	A,G	NONE			
	09/18/1987	379	A,G	NONE			
	09/18/1987	1075	A,G	NONE			
	09/20/1987	332	A,G	NONE			
	09/22/1987	159	A,G	NONE			
	09/22/1987	169	A,C,L	NONE			
	09/22/1987	272	A,H	NONE			
	09/22/1987	1076	A,B	NONE			
	09/23/1987	160	A,B	NONE			
	09/23/1987	450	A,B	NONE			
	09/24/1987	380	A,D	NONE			
	09/24/1987	1077	A,C	NONE			
	09/25/1987	333	A,C	NONE			
	09/25/1987	334	A,C	NONE			
	09/25/1987	170	A,B,M	NONE			
	09/28/1987	173	A,B,M	NONE			
	09/29/1987	173	A,B,M	NONE			
	10/01/1987	189	A,B,M	NONE			
	10/02/1987	335	A,B,M	NONE			
	10/03/1987	170	A,B,M	NONE			
	10/05/1987	336	A,B,M	NONE			
	10/05/1987	190	A,B,M	NONE			
	10/06/1987	337	A,B,M	NONE			
	10/06/1987	338	A,B,M	NONE			
	10/08/1987	382	A,I	HIGH			
	10/08/1987	1078	A,D,G	NONE			
	10/10/1987	383	A,D,G	NONE			

SOURCE: ENGINE MANUFACTURER

E DATE	EVT#	ENG	POS	ETIME	SIGN	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL	RULES	LT	CONDOS	WEATHER	CREW	AC	BIRD	SEE
10/10/1987	448				NONE		UNKNOWN	TAKEOFF	250	170		CLEAR		NONE	NONE	SEVERAL			
10/11/1987	384				NONE		UNKNOWN	TAKEOFF	0	0				NONE	ATO	ONE			
10/11/1987	1079	2		8:08:00	NONE		UNKNOWN	TAKEOFF						NONE	NONE	ONE			
10/11/1987	1080	2			NONE		UNKNOWN	TAKEOFF						NONE	NONE				
10/13/1987	1081	2		12:00:00	NONE		UNKNOWN	CRUISE						NONE	NONE				
10/14/1987	191	2			NONE		UNKNOWN	UNKNOWN						NONE	NONE				
10/15/1987	385	2			NONE		UNKNOWN	UNKNOWN						NONE	NONE				
10/16/1987	192	1			NONE		UNKNOWN	APPROACH						NONE	NONE				
10/17/1987	386	1		15:00:00	NONE		UNKNOWN	CRUISE	4000	190		DARK		BELLOW CLOUDS	NONE				
10/19/1987	193	1			NONE		UNKNOWN	LANDING						NONE	NONE				
10/20/1987	387	1			NONE		UNKNOWN	UNKNOWN						NONE	NONE				
10/21/1987	388				NONE		UNKNOWN	TAKEOFF	0	0		VFR						FLOCK	
10/23/1987	194	2			NONE		UNKNOWN	UNKNOWN						NONE	NONE				
10/24/1987	168	2			NONE		UNKNOWN	UNKNOWN						NONE	NONE				
10/25/1987	195	1		14:36:00	NONE		UNKNOWN	LANDING	0	100				NONE	NONE				
10/26/1987	339	2			NONE		UNKNOWN	TAKEOFF						NONE	NONE				
10/28/1987	176	2			NONE		UNKNOWN	UNKNOWN						NONE	NONE				
10/28/1987	182	2			NONE		UNKNOWN	UNKNOWN						NONE	NONE				
10/28/1987	435				TRVS	FRAC	UNKNOWN	CRUISE	4500	210		DARK		CLEAR		NONE	ATO	ATO	ONE
10/29/1987	389				NONE		UNKNOWN	TAKEOFF	0	140				NONE	NONE				
10/29/1987	1082	2			NONE		UNKNOWN	TAKEOFF	0	0		VFR		CLEAR		ATO	ATO	ATO	
10/30/1987	273				NONE		UNKNOWN	TAKEOFF	0	80		DAY		LOW CLOUDS		NO	NO	FLOCK	
10/31/1987	174	1		14:02:00	NONE		UNKNOWN	APPROACH	200	135		DAWN		DAWN		NONE	NONE		
11/02/1987	196	1		7:00:00	MULT	ENG	UNKNOWN	APPROACH	200	135		DAWN		DAWN		NONE	NONE		
11/02/1987	198	2		7:00:00	MULT	ENG	UNKNOWN	APPROACH	0	115		DAWN		DAWN		NONE	NONE		
11/03/1987	340	2			NONE		UNKNOWN	TAKEOFF	0	100				NONE	NONE				
11/04/1987	422	1			MULT	BIRDS	UNKNOWN	TAKEOFF	0	100				NONE	NONE				
11/05/1987	390	2		19:50:00	MULT	BIRDS	UNKNOWN	TAKEOFF	0	130				NONE	NONE				
11/06/1987	5	198			NONE		UNKNOWN	CLIMB	5000	250		VFR				YES	NO		
11/07/1987	183	2		22:15:00	NONE		UNKNOWN	LANDING	275	128		VFR		CLEAR		NONE	NONE		
11/08/1987	177	2		8:10:00	NONE		UNKNOWN	TAKEOFF	0	90		VFR		BRIGHT		ATO	ATO	NO	YES
11/09/1987	1083	1			NONE		UNKNOWN	TAKEOFF	0	0				CLEAR		ATO	ATO	ATO	
11/10/1987	1084	2			NONE		UNKNOWN	TAKEOFF	0	75		VFR		CLEAR		ATO	ATO	ATO	SEVERAL
11/10/1987	1085	2			NONE		UNKNOWN	TAKEOFF	0	150		VFR		BRIGHT		ATO	ATO	ATO	
11/10/1987	198	1		14:45:00	NONE		UNKNOWN	CLIMB	0	128				NONE	NONE				
11/10/1987	452	2			NONE		UNKNOWN	LANDING	0	0				NONE	NONE				
11/11/1987	341	1			NONE		UNKNOWN	TAKEOFF	0	75		VFR		CLEAR		ATO	ATO	ATO	
11/12/1987	175	2		13:50:00	MULT	BIRDS	UNKNOWN	TAKEOFF	0	150		VFR		CLEAR		ATO	ATO	ATO	
11/13/1987	199	2		12:40:00	NONE		UNKNOWN	TAKEOFF	0	150		VFR		BRIGHT		ATO	ATO	ATO	
11/14/1987	436			9:52:00	NONE		UNKNOWN	CLIMB	0	150		VFR		BRIGHT		ATO	ATO	ATO	
11/14/1987	729	2			NONE		UNKNOWN	LANDING	0	0				NONE	NONE				
11/15/1987	200	1			NONE		UNKNOWN	TAKEOFF	0	75		VFR		CLEAR		ATO	ATO	ATO	
11/15/1987	274	2			NONE		UNKNOWN	TAKEOFF	0	150		VFR		CLEAR		ATO	ATO	ATO	
11/16/1987	437				NONE		UNKNOWN	CLIMB	0	150		VFR		BRIGHT		ATO	ATO	ATO	
11/16/1987	199	2			NONE		UNKNOWN	LANDING	0	0				NONE	NONE				
11/17/1987	436	1			NONE		UNKNOWN	TAKEOFF	0	75		VFR		BRIGHT		ATO	ATO	ATO	
11/18/1987	391				NONE		UNKNOWN	TAKEOFF	0	100		DARK				ATO	ATO	ATO	
11/19/1987	1085	1		19:25:00	NONE		UNKNOWN	TAKEOFF	0	100		DUSK		CLEAR		ATO	ATO	ATO	
11/19/1987	201	1		17:00:00	NONE		UNKNOWN	TAKEOFF	0	100		DUSK		CLEAR		ATO	ATO	ATO	
11/20/1987	275	2			NONE		UNKNOWN	TAKEOFF	0	100		DUSK		CLEAR		ATO	ATO	ATO	
11/21/1987	275	2			NONE		UNKNOWN	TAKEOFF	0	100		DUSK		CLEAR		ATO	ATO	ATO	
11/22/1987	421	1		16:45:00	NONE		UNKNOWN	TAKEOFF	0	100		DUSK		CLEAR		ATO	ATO	ATO	
11/23/1987	421	2			MULT	ENG	UNKNOWN	TAKEOFF	0	100		DUSK		CLEAR		ATO	ATO	ATO	
11/24/1987	392	2		7:55:00	NONE		UNKNOWN	TAKEOFF	1000	160						ATO	ATO	ATO	
11/25/1987	202	2			NONE		UNKNOWN	TAKEOFF	0	135		VFR		CLEAR		ATO	ATO	ATO	
11/26/1987	393	2		21:50:00	NONE		UNKNOWN	TAKEOFF	0	120		VFR		PARTLY CLOUD		ATO	ATO	ATO	
11/26/1987	453	2			MULT	ENG-BIRDS	UNKNOWN	TAKEOFF	0	120		VFR		PARTLY CLOUD		ATO	ATO	ATO	
11/27/1987	1087	1		19:32:00	NONE		UNKNOWN	TAKEOFF	0	90		VFR		DAY		NO	NO	FLOCK	
11/28/1987	179	2		20:00:00	NONE		UNKNOWN	TAKEOFF	0	90		VFR		DAY		NO	NO	FLOCK	
11/29/1987	343	2			NONE		UNKNOWN	TAKEOFF	0	90		VFR		DAY		NO	NO	ONE	
11/30/1987	216	1		9:13:00	NONE		UNKNOWN	TAKEOFF	0	123		VFR		DAY		NO	NO	NO	
11/31/1987	344	2			MULT	BIRDS	UNKNOWN	TAKEOFF	0	123		VFR		DAY		NO	NO	NO	
12/01/1987	217	1			MULT	ENG	UNKNOWN	TAKEOFF	0	123		VFR		DAY		NO	NO	NO	
12/02/1987	345	2			MULT	ENG-BIRDS	UNKNOWN	TAKEOFF	0	123		VFR		DAY		NO	NO	NO	
12/03/1987	343	2			MULT	ENG-BIRDS	UNKNOWN	TAKEOFF	0	123		VFR		DAY		NO	NO	NO	
12/04/1987	218	1			MULT	ENG	UNKNOWN	TAKEOFF	0	123		VFR		DAY		NO	NO	NO	
12/05/1987	217	2			MULT	BIRDS	UNKNOWN	TAKEOFF	0	123		VFR		DAY		NO	NO	NO	
12/06/1987	216	2			MULT	BIRDS	UNKNOWN	TAKEOFF	0	123		VFR		DAY		NO	NO	NO	
12/07/1987	277	2			MULT	BIRDS	UNKNOWN	TAKEOFF	0	123		VFR		DAY		NO	NO	NO	
12/08/1987	276	2			MULT	BIRDS	UNKNOWN	TAKEOFF	0	123		VFR		DAY		NO	NO	NO	

SOURCE: ENGINE MANUFACTURER

SOURCE : ENGINE MANUFACTURER	EVT#	ENG	POS	DNG	CODE	SEVERITY	POM LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
	10/10/1987	448		A,B		3	9	3	3		FOUND DURING GROUND INSPECTION
	10/11/1987	384		A,B		3	9	3	3		3 F BLDS MINOR LE DAMAGE
	10/11/1987	1079	2	A,B		3	9	3	3		1 F BLD MINOR LE DAMAGE
	10/11/1987	1080	222	A,B		3	9	3	3		TIP CORNER LE BENT ON 5 FAN BLADES
	10/13/1987	1081				3	9	3	3		
	10/14/1987	191	2	A,B		3	9	3	3		
	10/14/1987	214	1	A,C		3	9	3	3		
	10/15/1987	385	2	A,C		3	9	3	3		
	10/16/1987	192	1	None		3	9	3	3		NO
	10/17/1987	386		None		3	9	3	3		NIGHT EVENT
	10/19/1987	193	1	A,H		3	9	3	3		NO
	10/20/1987	387	1	A,C		3	9	3	3		
	10/21/1987	388		None		3	9	3	3		NO
	10/23/1987	194	2	A,B,H		3	9	3	3		NO
	10/24/1987	168	2	A,C		3	9	3	3		
	10/25/1987	339	2	None		3	9	3	3		
	10/26/1987	176		COMPRESSOR		3	9	3	3		
	10/28/1987	182	2	A,C		3	9	3	3		
	10/28/1987	187	2	A,I		3	9	3	3		
	10/28/1987	435				3	9	3	3		
	10/29/1987	389	2			3	9	3	3		
	10/30/1987	1082	2	A,D,G,K		3	9	3	3		
	10/31/1987	273	1	A,H		3	9	3	3		
	11/01/1987	174	1	None		3	9	3	3		
	11/02/1987	196	2	None		3	9	3	3		
	11/03/1987	340		None		3	9	3	3		
	11/04/1987	422		None		3	9	3	3		
	11/05/1987	390	2	A,H		3	9	3	3		
	11/05/1987	728		None		3	9	3	3		
	11/06/1987	728		A,C		3	9	3	3		
	11/07/1987	183		A,C		3	9	3	3		
	11/08/1987	1083	-2	A,D,N,N		3	9	3	3		
	11/09/1987	1084	-2			3	9	3	3		
	11/10/1987	185	2	A,B,C		3	9	3	3		
	11/10/1987	198	-1	A,D,G		3	9	3	3		
	11/11/1987	452	2			3	9	3	3		
	11/11/1987	341	-1	A,D		3	9	3	3		
	11/12/1987	175	-1	A,H		3	9	3	3		
	11/13/1987	199	2	None		3	9	3	3		
	11/14/1987	436		None		3	9	3	3		
	11/14/1987	729	2	A,E,K		3	9	3	3		
	11/15/1987	200	-1	A,H		3	9	3	3		
	11/15/1987	274	2	None		3	9	3	3		
	11/16/1987	437		A		3	9	3	3		
	11/17/1987	391				3	9	3	3		
	11/18/1987	1085	-1	A,B		3	9	3	3		
	11/19/1987	201	-1	A,C		3	9	3	3		
	11/20/1987	215	-1	A,D		3	9	3	3		
	11/21/1987	392	-1			3	9	3	3		
	11/22/1987	202	-1			3	9	3	3		
	11/23/1987	227	-1			3	9	3	3		
	11/24/1987	393	-1			3	9	3	3		
	11/25/1987	203	-1			3	9	3	3		
	11/26/1987	342	-1			3	9	3	3		
	11/26/1987	453	-1			3	9	3	3		
	11/27/1987	1087	-1	A,G,K		3	9	3	3		
	12/01/1987	179	-1	A,C		3	9	3	3		
	12/02/1987	343	-1	None		3	9	3	3		
	12/03/1987	216	-1	A,C		3	9	3	3		
	12/04/1987	344	-1	A,D		3	9	3	3		
	12/06/1987	217	-1	None		3	9	3	3		
	12/08/1987	279	-1			3	9	3	3		

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG	POS	ETIME	SIGN	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL	RULES	LT	CONDOS	WEATHER	CREW	AC	CREW AL	BIRD SEE
12/11/1987	180	1		7:20:00	MULT	BIRDS	200	LANDING	0	100	VFR		TWILIGHT						FLOCK
12/12/1987	394	2			NONE		200	UNKNOWN											
12/13/1987	731	2			NONE		200	UNKNOWN											
12/15/1987	203	1			NONE		300	LANDING	210										
12/15/1987	732	1		15:00:00	MULT	BIRDS	200	TAKEOFF	50	110	VFR		DAY	PARTLY	CLOUD	ATO	NO		FLOCK
12/17/1987	181	1			NONE		200	UNKNOWN	0										NO
12/23/1987	278	1			NONE		200	UNKNOWN											YES
12/24/1987	1086	2			NONE		200	UNKNOWN											
12/29/1987	186	2			NONE		200	UNKNOWN											
01/03/1988	733	2			NONE		200	UNKNOWN											
01/03/1988	1088	1		8:49:00	NONE		200	UNKNOWN	0	100						ATO	NO		SEVERAL
01/04/1988	535	1			NONE		200	UNKNOWN											
01/05/1988	1089	2			NONE		200	UNKNOWN											
01/07/1988	279	2			NONE		200	UNKNOWN								ATO	ATO	ATO	NO
01/11/1988	395	2			NONE		200	UNKNOWN											
01/14/1988	734	2			NONE		200	UNKNOWN											
01/15/1988	734	1			NONE		200	UNKNOWN											
01/17/1988	220	1		10:58:00	NONE		200	UNKNOWN	0	100						ATO	NO	ONE	
01/19/1988	1090	2			NONE		200	UNKNOWN											
01/19/1988	221	1		18:40:00	NONE		200	UNKNOWN	0	160						ATO	NO	ONE	
01/20/1988	1091	2		18:50:00	NONE		200	UNKNOWN	200	125						ATO	NO		
01/21/1988	735	1			NONE		200	UNKNOWN	0	140									
01/22/1988	735	2			NONE		200	UNKNOWN											
01/25/1988	222	1			NONE		200	UNKNOWN											
01/25/1988	284	2			NONE		200	UNKNOWN											
01/25/1988	285	1		12:05:00	NONE		200	UNKNOWN	0	+V1	VFR								YES
01/26/1988	736	2			NONE		200	UNKNOWN											
01/26/1988	286	1			NONE		200	UNKNOWN											
01/26/1988	287	2			NONE		200	UNKNOWN											
01/27/1988	737	1			NONE		200	UNKNOWN											
02/05/1988	396	2			NONE		200	UNKNOWN											
02/06/1988	287	1			NONE		200	UNKNOWN											
02/06/1988	738	2			NONE		200	UNKNOWN											
02/07/1988	288	1		8:30:00	NONE		200	UNKNOWN	0										
02/08/1988	289	2			NONE		200	UNKNOWN											
02/08/1988	290	1			NONE		200	UNKNOWN											
02/09/1988	288	2			NONE		200	UNKNOWN											
02/10/1988	291	2		22:00:00	INV	POW LOSS	3000	TAKEOFF	100	128			DARK	RAIN					FLOCK
02/11/1988	739	1			NONE		200	UNKNOWN											SEVERAL
02/12/1988	292	1			NONE		200	UNKNOWN											
02/12/1988	293	2			NONE		200	UNKNOWN											
02/13/1988	397	1		18:15:00	NONE		200	UNKNOWN	250	145	VFR								YES
02/13/1988	298	2			NONE		200	UNKNOWN											
02/15/1988	298	2			NONE		200	UNKNOWN											
02/15/1988	1093	1		12:20:00	NONE		200	UNKNOWN	4000	210									SEVERAL
02/16/1988	1094	1		12:30:00	NONE		200	UNKNOWN	0	146									
02/18/1988	399	1			NONE		200	UNKNOWN											
02/18/1988	1095	2			NONE		200	UNKNOWN											
02/19/1988	281	1		6:55:00	NONE		200	UNKNOWN											
02/19/1988	293	2			NONE		200	UNKNOWN											
02/20/1988	741	1		7:10:00	NONE		200	UNKNOWN											
02/21/1988	1096	2			NONE		200	UNKNOWN											
02/24/1988	294	1		5:55:00	NONE		200	UNKNOWN											
02/24/1988	742	2		14:40:00	NONE		200	UNKNOWN											
02/26/1988	400	1			NONE		200	UNKNOWN											
02/27/1988	295	1			NONE		200	UNKNOWN											
02/28/1988	743	2			NONE		200	UNKNOWN											
03/02/1988	401	1		14:45:00	NONE		200	UNKNOWN	14:45										
03/10/1988	1097	1		17:30:00	NONE		200	UNKNOWN	17:30										
03/11/1988	744	2			NONE		200	UNKNOWN											
03/13/1988	282	2			NONE		200	UNKNOWN											
03/14/1988	296	1			NONE		200	UNKNOWN											
03/18/1988	745	2			NONE		200	UNKNOWN											
03/20/1988	298	1		11:10:00	NONE		200	UNKNOWN	11:10										
03/21/1988	746	2		10:40:00	NONE		200	UNKNOWN	10:40										
03/22/1988	1098	2		19:37:00	NONE		200	UNKNOWN	19:37										

SOURCE: ENGINE MANUFACTURER

E DATE	EVT#	ENG	BIRD	POS	NAM	BIRD_SPE	# BIRDS	WT	OZ_1	CTY	PRS	AIRPORT	LOCATE	US	INCID	ENGINE	DASH	
12/11/1987	180	1	HUNGARIAN	PARTIDGE		4L85		3		8.	TXL-HAJ		HANOVER, GERMANY	NO	NO	JT8D	15A	
12/12/1987	364	2								-DUB	DUB		DUBLIN, IRELAND	NO	NO	JT8D	17	
12/13/1987	731	2	GULL*							DYR	DYR		PARIS/ÖRLY, FRANCE	NO	NO	CFM56	3	
12/15/1987	203	1	COMMON	LAPWING		SN1		2		6.	BOS-CLT	CLT		LASHAM, ENGLAND	NO	NO	JT8D	17
12/17/1987	752	1	OWL*							YYC	YYC		CHARLOTTE, NC	NO	YES	JT8D	15	
12/20/1987	181									SXR-IXJ	SXR		CALGARY, ALTA, CANADA	NO	NO	JT8D	17	
12/23/1987	278	1								SRNAGAR	INDIA		SR NAGAR, INDIA	NO	NO	JT8D	17	
12/24/1987	219	2								INDIA	INDIA		LAGOS, NIGERIA	NO	NO	JT8D	15	
12/29/1987	186	2								TAIWAN	TAIWAN		TAIWAN, TAIWAN	NO	NO	JT8D	7A	
01/03/1988	733	2	VULTURE*							COIMBATORE	INDIA		MAR DEL PLATA, ARGENTINA	NO	NO	JT8D	9A	
01/04/1988	1088	1								INDIA	INDIA		COCHIN, INDIA	NO	NO	JT8D	17	
01/05/1988	535	1	GULL*							DURBAN	S. AFRICA		DURBAN, S. AFRICA	NO	NO	JT8D	9A	
01/07/1988	1089	2								KINGSTON	JAMAICA		KINGSTON, JAMAICA	NO	NO	JT8D	15	
01/11/1988	395	2								MELBOURNE	AUSTRALIA		MELBOURNE, AUSTRALIA	NO	NO	CFM56	3	
01/14/1988	734	2	BROWN	FALCON		SK39		1		MEL	MEL		MAR DEL PLATA, ARGENTINA	NO	NO	JT8D	9A	
01/15/1988	220	1								TRIVANDRUM	INDIA		TRIVANDRUM, INDIA	NO	NO	JT8D	17A	
01/17/1988	1090	2								BANGALORE	INDIA		BANGALORE, INDIA	NO	NO	JT8D	15	
01/19/1988	221	1								CALGARY	ALTA, CANADA		CALGARY, ALTA, CANADA	NO	NO	JT8D	17A	
01/20/1988	1091	2	KITE*							HYD	HYD		HYDERABAD, INDIA	NO	NO	JT8D	17A	
01/21/1988	735	1								INDIA	INDIA		INDIA, INDIA	NO	NO	JT8D	9A	
01/22/1988	736	2								SALTA	ARGENTINA		SALTA, ARGENTINA	NO	NO	JT8D	9A	
01/25/1988	222	2								BUENOS AIRES	ARGENTINA		BUENOS AIRES, ARGENTINA	NO	NO	JT8D	17A	
01/25/1988	284	2								CASABLANCA	MOROCCO		CASABLANCA, MOROCCO	NO	NO	JT8D	9A	
01/28/1988	285	1								AMSTERDAM	NETHERLANDS		AMSTERDAM, NETHERLANDS	NO	NO	CFM56	3	
01/30/1988	223	1	GOLDEN	PLOVER		SN25		1		GOVERNORS	HARBOUR		GOVERNORS HARBOUR, BAHAMAS	NO	YES	CFM56	9A	
02/01/1988	286	2	BAR-SHOULDERED	DOVE		2P103				BAHAMAS	BAHAMAS		BAHAMAS	NO	NO	JT8D	3	
02/05/1988	396	2								LINHUE	KAUA'I, HAWAII		LINHUE, KAUA'I, HAWAII	YES	YES	CFM56	3	
02/06/1988	737	1								ONTARIO	CA		ONTARIO, CA	NO	NO	JT8D	7A	
02/06/1988	287	1								GOTHENBURG	SWEDEN		GOTHENBURG, SWEDEN	NO	NO	CFM56	3	
02/06/1988	738	1								TAIWAN	TAIWAN		TAIWAN, TAIWAN	NO	NO	JT8D	9A	
02/07/1988	739	1								LAHORE	PAKISTAN		LAHORE, PAKISTAN	NO	NO	CFM56	17A	
02/08/1988	289	2								CA	CA		CA, CA	YES	YES	CFM56	7A	
02/08/1988	740	2								TAIWAN	TAIWAN		TAIWAN, TAIWAN	NO	NO	JT8D	9A	
02/09/1988	288	1								PHOENIX	ARIZONA		PHOENIX, ARIZONA	NO	YES	CFM56	3	
02/10/1988	291	2								RIO DE JANEIRO	BRAZIL		RIO DE JANEIRO, BRAZIL	NO	NO	CFM56	3	
02/11/1988	292	1								DUNEDIN	NEW ZEALAND		DUNEDIN, NEW ZEALAND	NO	YES	CFM56	3	
02/11/1988	397	1								SARASOTA	BRADENTON, FL		SARASOTA/BRADENTON, FL	NO	NO	JT8D	7	
02/15/1988	280	2								ENGLAND	ENGLAND		ENGLAND, ENGLAND	NO	NO	JT8D	9A	
02/15/1988	398	2								BHOPAL	INDIA		BHOPAL, INDIA	NO	NO	JT8D	9A	
02/16/1988	1094	2								RANCHI	INDIA		RANCHI, INDIA	NO	NO	JT8D	9A	
02/18/1988	399	2								DELHI	INDIA		DELHI, INDIA	NO	NO	JT8D	9A	
02/19/1988	281	2								BRISBANE	AUSTRALIA		BRISBANE, AUSTRALIA	NO	NO	JT8D	9A	
02/19/1988	293	1								HYDERABAD	INDIA		HYDERABAD, INDIA	NO	NO	JT8D	17	
02/20/1988	741									SAN FRANCISCO/OAKLAND	CA		SAN FRANCISCO/OAKLAND, CA	YES	YES	CFM56	3	
02/21/1988	1096	1								DALLAS/FT. WORTH	TEXAS		DALLAS/FT. WORTH, TEXAS	NO	NO	JT8D	9A	
02/24/1988	294	1								TUCUMAN	ARGENTINA		TUCUMAN, ARGENTINA	NO	NO	JT8D	9A	
02/26/1988	742	1								DELHI	INDIA		DELHI, INDIA	NO	NO	JT8D	9A	
02/27/1988	295	1								BRISBANE	AUSTRALIA		BRISBANE, AUSTRALIA	NO	NO	JT8D	9A	
02/28/1988	743	2								CHRISTCHURCH	NEW ZEALAND		CHRISTCHURCH, NEW ZEALAND	NO	NO	JT8D	17A	
03/02/1988	401	1								GRAN CANARIA/CANARY ISLANDS	SPAIN		GRAN CANARIA/CANARY ISLANDS	NO	NO	CFM56	3	
03/02/1988	1097	1								BUENOS AIRES	ARGENTINA		BUENOS AIRES, ARGENTINA	NO	NO	CFM56	3	
03/03/1988	402	1								VARAMASI	INDIA		VARAMASI, INDIA	NO	NO	JT8D	17	
03/03/1988	744	2								NEW YORK	NY-NJ-NEWARK		NEW YORK, NY-NJ-NEWARK	YES	YES	CFM56	3	
03/03/1988	282	2								STUTTGART	GERMANY		STUTTGART, GERMANY	NO	NO	JT8D	15	
03/03/1988	296	2								HILO	HAWAII		HILO, HAWAII	YES	YES	CFM56	3	
03/03/1988	297	2								NEW YORK-LA GUARDIA	NEW YORK		NEW YORK-LA GUARDIA	NO	NO	JT8D	9A	
03/03/1988	745	1								SALEM	NC		SALEM, NC	YES	YES	CFM56	3	
03/03/1988	298	1								CATAMARCA	ARGENTINA		CATAMARCA, ARGENTINA	NO	NO	CFM56	3	
03/03/1988	746	1								MOUNTAIN	USA		MOUNTAIN, USA	NO	NO	CFM56	3	
03/03/1988	299	1								GENEVA	SWITZERLAND		GENEVA, SWITZERLAND	NO	NO	JT8D	15	
03/03/1988	747	2								BANGALORE	INDIA		BANGALORE, INDIA	NO	NO	JT8D	9A	
03/22/1988	1098	2																

SOURCE: ENGINE MANUFACTURER

EDATE	EVN#	ENG_POS	DNG_CODE	SEVERITY	PWV LOSS	MAX_VIBE	THROTTLE	I_FSD	REMARKS
12/1/1987	180	1	A,D,H	2	NONE	3	0	NO	
12/12/1987	396	2	A,C,G	2	NONE	2	0	NO	ENGINE REMOVED
12/13/1987	731	1	A,G	2	NONE	2	0	NO	ENGINE REMOVED
12/15/1987	203	1	A,G	2	COMPRESSOR	2	0	NO	
12/15/1987	732	1	A,C,G	2	COMPRESSOR	2	0	NO	
12/17/1987	181	1	A,G	2	NONE	2	0	NO	
12/20/1987	298	1	A,G	2	NONE	2	0	NO	
12/23/1987	219	2	A,G	2	NONE	2	0	NO	
12/24/1987	1086	2	A,C	2	NONE	2	0	NO	
01/03/1988	733	2	A,D	2	NONE	2	0	NO	
01/03/1988	1083	2	A,K	2	NONE	2	0	NO	
01/04/1988	535	1	A,C	2	NONE	2	0	NO	
01/05/1988	1089	2	A,G	2	NONE	2	0	NO	
01/07/1988	279	2	A,G	2	NONE	2	0	NO	
01/10/1988	395	2	A,G	2	NONE	2	0	NO	
01/11/1988	283	2	A,C	2	NONE	2	0	NO	
01/15/1988	734	2	A,C	2	NONE	2	0	NO	
01/17/1988	1090	2	A,C	2	NONE	2	0	NO	
01/19/1988	220	1	A,C	2	NONE	2	0	NO	
01/20/1988	221	1	A,C	2	NONE	2	0	NO	
01/21/1988	1091	2	A,C	2	NONE	2	0	NO	
01/21/1988	735	2	A,C	2	NONE	2	0	NO	
01/22/1988	736	2	A,C	2	NONE	2	0	NO	
01/25/1988	224	2	A,C	2	NONE	2	0	NO	
01/25/1988	285	1	A,C,H	2	NONE	2	0	NO	
01/28/1988	286	1	A,C	2	NONE	2	0	NO	
01/28/1988	287	1	A,D	2	NONE	2	0	NO	
02/01/1988	396	2	A,C,H	2	NONE	2	0	NO	
02/05/1988	737	1	A,D	2	NONE	2	0	NO	
02/06/1988	738	1	A,D	2	NONE	2	0	NO	
02/06/1988	739	1	A,D	2	NONE	2	0	NO	
02/07/1988	289	2	A,L	2	NONE	2	0	NO	
02/08/1988	290	2	A,D	2	NONE	2	0	NO	
02/08/1988	740	2	A,D	2	NONE	2	0	NO	
02/09/1988	288	2	A,I,M,P	2	NONE	2	0	NO	
02/10/1988	291	2	A,I,M,P	2	HIGH	2	0	NO	
02/11/1988	292	1	A,I,M,P	2	NONE	2	0	NO	
02/11/1988	397	1	COMPRESSOR	2	NONE	2	0	NO	
02/15/1988	280	2	A,C	2	NONE	2	0	NO	
02/15/1988	398	2	A,C	2	NONE	2	0	NO	
02/16/1988	1093	2	A,C	2	NONE	2	0	NO	
02/18/1988	1094	2	A,C	2	NONE	2	0	NO	
02/18/1988	1095	2	A,C	2	NONE	2	0	NO	
02/19/1988	281	2	A,C,K	2	NONE	2	0	NO	
02/20/1988	741	2	A,H	2	NONE	2	0	NO	
02/21/1988	1096	2	A,H	2	NONE	2	0	NO	
02/24/1988	294	1	A,H	2	NONE	2	0	NO	
02/24/1988	742	1	A,B,E,H	2	NONE	2	0	NO	
02/24/1988	400	1	A,H	2	NONE	2	0	NO	
02/26/1988	295	1	A,B,E,H	2	NONE	2	0	NO	
02/27/1988	743	2	A,H	2	NONE	2	0	NO	
02/28/1988	401	2	A,H	2	NONE	2	0	NO	
03/02/1988	1097	1	A,H	2	NONE	2	0	NO	
03/07/1988	402	1	A,H	2	NONE	2	0	NO	
03/10/1988	744	2	A,H	2	NONE	2	0	NO	
03/11/1988	282	2	A,H	2	NONE	2	0	NO	
03/13/1988	296	2	A,L	2	NONE	2	0	NO	
03/14/1988	297	2	A,L	2	NONE	2	0	NO	
03/18/1988	745	2	A,G	2	NONE	2	0	NO	
03/20/1988	298	2	A,G	2	NONE	2	0	NO	
03/21/1988	746	2	A,G	2	NONE	2	0	NO	
03/22/1988	1098	2	A,G	2	NONE	2	0	NO	

SOURCE: ENGINE MANUFACTURER

SOURCE : ENGINE MANUFACTURER

EVT#	ENG	POS	BIRD_NAM	BIRD_SPE	#_BIRDS	WT	OZ	1	CITY	PRS	AIRPORT	LOCATE	US	INCID	ENGINE	DASH
03/24/1988	299	2							MSY			NEW ORLEANS, LOUISIANA	YES	CM56	3	
03/25/1988	403	1							-CHC			CHRISTCHURCH, NEW ZEALAND	NO	JT80		
03/30/1988	1099	2							IXM-MAA			MADRAS, INDIA	NO	JT80	17	
04/01/1988	404	1	PLOVER*						ITO-HNL	I TO		HILDA, HAWAII	YES	JT80	9A	
04/02/1988	346	2							YYJ-YJC	YYJ		CALGARY, ALTA., CANADA	NO	JT80		
04/03/1988	405	1							LTH-HNL	LIH		LIHUE, KAUAI, HAWAII	YES	JT80	9A	
04/04/1988	462	1	BLACKCROWNED NIGHT HERON	1124	1	22.			-YVR	TUC		VANCOUVER, CANADA	NO	CFM56		
04/05/1988	747	1							SMF			TUCUMAN, ARGENTINA	NO	JT80	9	
04/06/1988	461	2							KIN			SACRAMENTO, CALIFORNIA	YES	CFM56		
04/06/1988	406	2							DEN-OKC	OKC		KINGSTON, JAMAICA	NO	JT80	15	
04/07/1988	407	2							IND-NOU	INU		OKLAHOMA CITY, OKLA	YES	JT80		
04/08/1988	448	1	KITE*									NAURU, REP OF MAURA	NO	JT80	17	
04/08/1988	408	1										NIGERIA	NO	JT80	15	
04/09/1988	463	1										GREECE-YUGOSLAVIA	NO	CFM56		
04/09/1988	464	2										BEIJING, CHINA	NO	CFM56		
04/10/1988	489	2										KAGOSHIMA, JAPAN	NO	JT80	9A	
04/12/1988	347	2	PLOVER*									KAHULUI, MAUI, HAWAII	YES	JT80	9A	
04/12/1988	409	2										CHRISTCHURCH, NEW ZEALAND	NO	JT80		
04/13/1988	411	2										FORMOSA, ARGENTINA	NO	CFM56		
04/13/1988	465	1										HAMBURG, GERMANY	NO	CFM56	3	
04/14/1988	410	2										WELLINGTON, NEW ZEALAND	NO	CFM56		
04/14/1988	466	1										RECIFE, BRAZIL	NO	CFM56		
04/21/1988	490	1										SHIMOJI SHIMA, JAPAN	NO	JT80	3	
04/22/1988	749	1										MAR DEL PLATA, ARGENTINA	NO	JT80	17	
04/22/1988	348	2										HOUSTON, TEX	YES	JT80	9A	
04/22/1988	412	1										WASHINGTON, DC - LA	YES	JT80		
04/26/1988	349	1										LITTLE ROCK, ARK	YES	JT80	17A	
04/26/1988	413	2										DALLAS/FT WORTH, TEX-LOVE	YES	JT80	9A	
04/27/1988	350	1										TULSA, OKLA	YES	JT80		
04/27/1988	351	1										DEVEL & CO., COL	YES	CFM56		
04/28/1988	467	1										HOUSTON, TEX	YES	JT80	9A	
04/28/1988	352	1										SABA, NETH ANTILLES	NO	JT80		
04/29/1988	414	1										DELHI, INDIA	NO	JT80	15	
04/29/1988	1100	1										CAMPOM GRANDE, BRAZIL	NO	JT80		
05/01/1988	353	2										MIYAKO JIMA, JAPAN	NO	JT80		
05/01/1988	750	1										LOURDES/TARBES, FRANCE	NO	JT80	17	
05/02/1988	354	2										WELLINGTON, NEW ZEALAND	NO	JT80	15	
05/02/1988	415	2										DALLAS/FT WORTH, TEX-LOVE	YES	CFM56		
05/05/1988	468	2										HOUSTON, TEX	YES	CFM56		
05/06/1988	469	2										AMSTERDAM, NETHERLANDS	NO	CFM56		
05/11/1988	416	2										SAN ANTONIO, TEX	YES	CFM56		
05/11/1988	470	1										AUSTIN, TEX	YES	JT80	7B	
05/11/1988	471	1										NY-WASHINGTON DC	YES	CFM56		
05/15/1988	417	1	SWIFT*									SAO PAULO, BRAZIL	NO	JT80		
05/17/1988	355	1										MIDWAY, ILL	YES	JT80	17	
05/19/1988	472	1										PARS-S DE GAULLE, FRANCE	NO	CFM56		
05/20/1988	456	2	GULL*									HOUSTON, TEX	YES	JT80	15	
05/20/1988	751	2										TUNISIA	NO	JT80		
05/21/1988	473	1										DEALER, COL	YES	JT80		
05/22/1988	418	2										LUXOR, EGYPT	NO	JT80	17	
05/23/1988	419	1										TREVISO, ITALY	NO	CFM56		
05/25/1988	474	1										HYDERABAD, INDIA	NO	JT80		
05/25/1988	101	1	SWAINSON'S HAWK	3K171	1							FRANKFURT, GERMANY	NO	CFM56		
05/26/1988	475	2										CHICAGO, ILL-OHRE	YES	CFM56		
05/26/1988	533	2										ROCHESTER, NY	YES	JT80	9A	
06/04/1988	577	2										CORDOBA, ARGENTINA	NO	JT80	0	
06/06/1988	753	2	COMMON ROCK DOVE	2P1								DUESSELDORF, GERMANY	NO	JT80	17	
06/06/1988	754	2	COMMON TURTLE DOVE	2P50								WINNIPEG, CANADA	NO	CFM56		
06/07/1988	101	1	PIGEON*									FRESNO, CA	YES	CFM56		
06/07/1988	475	2										REGINA, SASK., CANADA	NO	JT80	9A	
06/08/1988	533	2										HYDERABAD, INDIA	YES	CFM56		
06/08/1988	577	2	HAWK*									BRISTOL, ENGLAND	NO	CFM56		
06/08/1988	753	2	NIGHTJAR*										NO	CFM56		
06/08/1988	476	1											NO	CFM56		
06/08/1988	492	2												CFM56		
06/10/1988	420	2												CFM56		
06/11/1988	576	2												CFM56		
06/11/1988	1102	2												CFM56		
06/12/1988	477	2												CFM56		
06/13/1988	478	2												CFM56		

SOURCE : ENGINE MANUFACTURER

EDATE	EV#	ENG	POS	DNG CODE	SEVERITY	POW LOSS	MAX VIBE	TMRDLE	IFSD	REMARKS
							CUTOFF	YES		IFSD+POW LOSS NOT DUE TO BIRD INGESTION
03/24/1988	299	2	A,D		2	9	NO			
03/25/1988	403	1	A,C		3	9				
03/30/1988	1099	2	A,C		3	9				
04/01/1988	404	2	A,D		2	9				
04/02/1988	405	1	A,D		1	9				
04/03/1988	462	1	A,D		2	9				
04/04/1988	767	1	A,D,G,K		2	9				
04/06/1988	461	2	A,G		2	9				
04/06/1988	406	2	A,D,G,K		2	9				
04/07/1988	407	2	A,D,G,K		2	9				
04/08/1988	748	1	A,D,G,K		1	9				
04/09/1988	408	1	A,H		1	9				
04/10/1988	463	2	A,D,G,K		2	9				
04/12/1988	347	2	A,D,G,K		2	9				
04/13/1988	409	1	A,D,G,K		1	9				
04/14/1988	465	2	A		1	9				
04/19/1988	466	1	A,D		2	9				
04/21/1988	490	2	A,D		2	9				
04/22/1988	769	2	A,C		2	9				
04/24/1988	348	1	A,C		2	9				
04/25/1988	412	2	A,C		2	9				
04/26/1988	413	1	A,C		2	9				
04/27/1988	350	1	A,C		2	9				
04/28/1988	352	1	A,C		2	9				
04/29/1988	414	1	A,C		2	9				
04/29/1988	1100	1	A		2	9				
05/01/1988	353	2	A		2	9				
05/01/1988	750	1	A,I		2	9				
05/02/1988	354	2	A,I		1	9				
05/04/1988	415	2	A,B,H		1	9				
05/05/1988	468	2	A,B,H		1	9				
05/06/1988	469	2	A,C		1	9				
05/11/1988	416	1	A,B,H		1	9				
05/11/1988	470	1	A,B,H		1	9				
05/15/1988	471	1	A,B,H		1	9				
05/19/1988	355	1	A,B,H		1	9				
05/20/1988	472	1	A,B,H		1	9				
05/21/1988	456	2	A,C,G,I		1	9				
05/22/1988	473	2	A,C,G,I		1	9				
05/23/1988	418	2	A,C,G,I		1	9				
05/23/1988	419	2	A,C,G,I		1	9				
05/25/1988	438	2	A,C,G,I		1	9				
05/27/1988	474	2	A,D,H		1	9				
06/01/1988	1101	1	A,H		2	9				
06/02/1988	533	2	A,H		2	9				
06/04/1988	577	2	A,H		2	9				
06/06/1988	752	2	A,H		2	9				
06/06/1988	753	2	A,G		2	9				
06/06/1988	754	2	A,G		2	9				
06/08/1988	439	2	A,G		2	9				
06/08/1988	476	2	A,G		2	9				
06/08/1988	492	2	A,C		2	9				
06/10/1988	420	2	A,C		2	9				
06/11/1988	576	2	A,B		2	9				
06/11/1988	1102	2	A,B		2	9				
06/13/1988	478	2	A,B		2	9				

SOURCE : ENGINE MANUFACTURER

E DATE	EVT#	ENG	POS	ETIME	SIGN_EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL RULES	L1 CONDS	WEATHER	CREW_AC	CREW_AL	B1<0 SEE	
06/13/1988	755	1			NONE	UNKNOWN	200	UNKNOWN								
06/14/1988	440	2			NONE	TAKEOFF	200	UNKNOWN								
06/14/1988	479				NONE	UNKNOWN	300	LANDING	0	70						
06/14/1988	480	2		18:15:00	NONE	TAKEOFF	300	LANDING	0	V1						
06/14/1988	756	1			NONE	TAKEOFF	300	LANDING	0	10						
06/15/1988	481	1			NONE	TAKEOFF	300	LANDING	0	10						
06/15/1988	757	1			NONE	OTHER	200	UNKNOWN								
06/16/1988	441				NONE	TAKEOFF	200	UNKNOWN								
06/16/1988	584	2			NONE	TAKEOFF	200	LANDING	0							
06/16/1988	442	2			MULT	TAKEOFF	200	TAKEOFF	0							
06/16/1988	443	2			BIRDS	TAKEOFF	200	TAKEOFF	0							
06/16/1988	482	1			NONE	TAKEOFF	200	TAKEOFF	0							
06/16/1988	483	2			MULT	TAKEOFF	200	TAKEOFF	0							
06/16/1988	445	2			NONE	TAKEOFF	200	TAKEOFF	0							
06/16/1988	758	2			NONE	TAKEOFF	200	TAKEOFF	0							
06/19/1988	759	2			NONE	TAKEOFF	200	TAKEOFF	0							
06/20/1988	444	2			NONE	TAKEOFF	200	TAKEOFF	0							
06/20/1988	482	1			NONE	TAKEOFF	200	TAKEOFF	0							
06/20/1988	483	2			MULT	TAKEOFF	200	TAKEOFF	0							
06/21/1988	1103	1			NONE	TAKEOFF	200	TAKEOFF	0							
06/21/1988	485	1			NONE	TAKEOFF	200	TAKEOFF	0							
06/22/1988	484	2			NONE	TAKEOFF	200	TAKEOFF	0							
06/22/1988	486	1			NONE	TAKEOFF	200	TAKEOFF	0							
06/22/1988	760	2			NONE	TAKEOFF	200	TAKEOFF	0							
06/24/1988	446	2			NONE	TAKEOFF	200	TAKEOFF	0							
06/24/1988	587	1			NONE	TAKEOFF	200	TAKEOFF	0							
06/25/1988	1103	1			NONE	TAKEOFF	200	TAKEOFF	0							
06/25/1988	485	1			NONE	TAKEOFF	200	TAKEOFF	0							
06/26/1988	486	1			NONE	TAKEOFF	200	TAKEOFF	0							
06/26/1988	486	1			NONE	TAKEOFF	200	TAKEOFF	0							
06/27/1988	493	2			NONE	TAKEOFF	200	TAKEOFF	0							
06/27/1988	761	1			NONE	TAKEOFF	200	TAKEOFF	0							
06/28/1988	487	1			NONE	TAKEOFF	200	TAKEOFF	0							
06/28/1988	488	2			NONE	TAKEOFF	200	TAKEOFF	0							
06/28/1988	494	2			NONE	TAKEOFF	200	TAKEOFF	0							
06/28/1988	762	2		7:13:00	NONE	MULT	200	TAKEOFF	0							
06/29/1988	1104	1			NONE	MULT	200	TAKEOFF	0							
06/30/1988	1105	1			NONE	MULT	200	TAKEOFF	0							
06/30/1988	1105	2			NONE	MULT	200	TAKEOFF	0							
06/30/1988	1106	2			NONE	MULT	200	TAKEOFF	0							
07/01/1988	497	2			NONE	MULT	200	TAKEOFF	0							
07/01/1988	536	1			NONE	MULT	200	TAKEOFF	0							
07/01/1988	536	2			NONE	MULT	200	TAKEOFF	0							
07/01/1988	1107	2			NONE	MULT	200	TAKEOFF	0							
07/02/1988	1108	2			NONE	MULT	200	TAKEOFF	0							
07/02/1988	763	1			NONE	MULT	200	TAKEOFF	0							
07/03/1988	1109	1			NONE	MULT	200	TAKEOFF	0							
07/03/1988	578	1			NONE	MULT	200	TAKEOFF	0							
07/05/1988	764	2			NONE	MULT	200	TAKEOFF	0							
07/07/1988	447	2			NONE	MULT	200	TAKEOFF	0							
07/07/1988	1110	2			NONE	MULT	200	TAKEOFF	0							
07/08/1988	765	1			NONE	MULT	200	TAKEOFF	0							
07/09/1988	495	2			NONE	MULT	200	TAKEOFF	0							
07/12/1988	496	2			NONE	MULT	200	TAKEOFF	0							
07/12/1988	1111	1			NONE	MULT	200	TAKEOFF	0							
07/14/1988	766	2			NONE	MULT	200	TAKEOFF	0							
07/15/1988	498	2			NONE	MULT	200	TAKEOFF	0							
07/15/1988	537	2			NONE	MULT	200	TAKEOFF	0							
07/15/1988	1112	1			NONE	MULT	200	TAKEOFF	0							
07/16/1988	538	2			NONE	MULT	200	TAKEOFF	0							
07/16/1988	1112	1			NONE	MULT	200	TAKEOFF	0							
07/18/1988	768	2			NONE	MULT	200	TAKEOFF	0							
07/18/1988	500	2			NONE	MULT	200	TAKEOFF	0							
07/19/1988	501	2			NONE	MULT	200	TAKEOFF	0							
07/19/1988	502	1			NONE	MULT	200	TAKEOFF	0							
07/19/1988	503	2			NONE	MULT	200	TAKEOFF	0							
07/19/1988	1320	2			NONE	MULT	200	TAKEOFF	0							
07/20/1988	539	2			NONE	MULT	200	TAKEOFF	0							
07/21/1988	504	1			NONE	MULT	200	TAKEOFF	0							
07/21/1988	588	2			NONE	MULT	200	TAKEOFF	0							
07/23/1988	505	1			NONE	MULT	200	TAKEOFF	0							
07/23/1988	541	1			NONE	MULT	200	TAKEOFF	0							

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG	BIRD	MAN	BIRD SPE	# BIRDS	WT	OZ	1	CTY	PRS	AIRPORT	LOCALE	US	INCID	ENGINE DASH
06/13/1988	755	1								TAIWAN				NO	JTBD	7A
06/14/1988	440	2								MONTRAL, CANADA				NO	JTBD	17
06/14/1988	479	1	HAWK*							FRANKFURT, GERMANY				NO	CFM56	3
06/14/1988	480	2								BRISBANE, AUSTRALIA				NO	CFM56	3
06/14/1988	756	1								MIYAKO JIMA, JAPAN				NO	JTBD	17
06/15/1988	481	1								NEW YORK, NY - NEWARK				YES	CFM56	3
06/15/1988	757	1	GULL*							RESISTENCIA ARGENTINA				NO	JTBD	9
06/16/1988	584	2								RIO DE JANEIRO, BRAZIL				NO	JTBD	9
06/16/1988	441	2	BONAPARTE'S GULL		14N38	1				PANAMA CITY, PANAMA				NO	JTBD	9A
06/18/1988	442	2	HERRING GULL		14N14	1				KAMLOOPS, CANADA				NO	JTBD	9A
06/18/1988	443	2							ST. JOHN'S, CANADA				NO	JTBD	9A	
06/18/1988	758	1							BELGIUM				NO	JTBD	9A	
06/19/1988	759	2							TAIWAN				NO	JTBD	7A	
06/20/1988	444	1	PIGEON*						YUL-YOU YUL				NO	JTBD	17	
06/20/1988	482	1	PIGEON*						-FRA				NO	CFM56	3	
06/21/1988	483	2							BNE				NO	CFM56	3	
06/21/1988	445	1	CATTLE EGRET						OCA-MAY				NO	JTBD	17	
06/22/1988	484	2							EUR-ORD				NO	CFM56	3	
06/22/1988	760	2							RES				YES	CFM56	3	
06/24/1988	446	2							-GIG				NO	JTBD	9	
06/25/1988	446	2							PTY				NO	JTBD	9	
06/25/1988	587	1	KITE*						YKA-YKA				NO	JTBD	9A	
06/26/1988	1103	1							YYT-YYT				NO	JTBD	9A	
06/26/1988	485	1							YHZ-YHZ				NO	JTBD	9A	
06/26/1988	489	1							YTT-YTT				NO	JTBD	9A	
06/27/1988	493	2							YUN-YUN				NO	JTBD	17	
06/27/1988	761	1	COMMON LAPWING		SN1	1			YOT-YAM				NO	CFM56	3	
06/28/1988	487	1							YOT-CLE				NO	CFM56	3	
06/28/1988	488	2							YAM-BOS				NO	JTBD	17	
06/28/1988	490	2							YAM-IXJ				NO	CFM56	3	
06/28/1988	762	2							YAM-XJC				NO	JTBD	17	
06/29/1988	1104	1							YAM-MXP				NO	CFM56	3	
06/30/1988	1105	1							YAM-MXP				NO	JTBD	17	
06/30/1988	1105	2							YAM-MXP				NO	CFM56	3	
06/30/1988	1106	2							YAM-MXP				NO	JTBD	17	
07/01/1988	497	2	VULTURE*						YAM-MXP				NO	CFM56	3	
07/01/1988	764	2	GULL*						YAM-MXP				NO	JTBD	17	
07/01/1988	536	1	HEMING GULL		14N14	1			YAM-MXP				NO	JTBD	17	
07/01/1988	1107	2							YAM-MXP				NO	JTBD	17	
07/01/1988	1108	2							YAM-MXP				NO	JTBD	17	
07/02/1988	763	1							YAM-MXP				NO	JTBD	17	
07/02/1988	1109	1	PARTRIDGE*						YAM-MXP				NO	JTBD	17	
07/03/1988	578	1	PIGEON*						YAM-MXP				NO	CFM56	3	
07/05/1988	447	2							YAM-MXP				NO	JTBD	17	
07/07/1988	764	2							YAM-MXP				NO	JTBD	17	
07/07/1988	1110	2							YAM-MXP				NO	JTBD	17	
07/08/1988	765	1	KITE*						YAM-MXP				NO	JTBD	17	
07/09/1988	498	2	SMALLOR*						YAM-MXP				NO	JTBD	17	
07/12/1988	1111	1							YAM-MXP				NO	JTBD	17	
07/14/1988	766	2							YAM-MXP				NO	JTBD	17	
07/15/1988	498	2							YAM-MXP				NO	JTBD	17	
07/15/1988	537	1							YAM-MXP				NO	CFM56	3	
07/15/1988	767	1	BLACK-HEADED GULL		14M36	1			YAM-MXP				NO	JTBD	17	
07/16/1988	1112	1							YAM-MXP				NO	CFM56	3	
07/16/1988	538	2							YAM-MXP				NO	JTBD	17	
07/17/1988	768	2	BLACK BIRD*						YAM-MXP				NO	CFM56	3	
07/18/1988	500	1	EURASIAN KESTREL		SK27	1			YAM-MXP				NO	JTBD	17	
07/19/1988	502	2							YAM-MXP				NO	CFM56	3	
07/19/1988	503	1	CARRION CROW		22294	1			YAM-MXP				NO	JTBD	17	
07/20/1988	539	1							YAM-MXP				NO	CFM56	3	
07/21/1988	504	1							YAM-MXP				NO	JTBD	17	
07/23/1988	505	1							YAM-MXP				NO	CFM56	3	
07/23/1988	542	1	CHIMNEY SWIFT		1033	1			YAM-MXP				NO	CFM56	3	
									YAM-MXP				YES	CFM56	3	

SOURCE: ENGINE MANUFACTURER

E DATE	EVT#	ENG	POS	DNG	CODE	SEVERITY	POW LOSS	MAX VIBE	THROTTLE	IFSD	REMARKS
06/13/1988	755	1	A,C	3		3	NONE				1 FAN BLADE BLENDLED ON WING SYMPTOM-EGT FOUND DURING GROUND INSPECTION
06/14/1988	440	2	A,C	3	NONE	3	NONE			NO	
06/14/1988	479	1	A,C	3	NONE	3	NONE			NO	
06/14/1988	480	2	A,D,N	2		2					
06/14/1988	756	1	A,C	3	NONE	3	NONE			NO	
06/15/1988	481	1	A,C	3		2					
06/15/1988	757	1	A,K	2	A,C,G,I	1	COMPRESSOR	HIGH			2 1ST STG COMPRESSOR BLADES DAMAGED
06/16/1988	584	2	A,C,G,I	2	A,D,N	2	NONE				METAL IN TAILPIPE SYMPTOM-EGT, 4 FAN BLADES DAMAGED, ODOR
06/18/1988	442	2	A,G	2		2	NONE				
06/18/1988	758	2	A,D	2		2	NONE				
06/19/1988	441	2	A,H	2		2	NONE				
06/19/1988	759	2	A,H	2		2	NONE				
06/20/1988	444	2	A,H	2		2	NONE				
06/20/1988	482	2	A,H	2		2	NONE				
06/20/1988	483	2	A,H	2		2	NONE				
06/21/1988	445	2	A	2		2	NONE				
06/22/1988	484	2	A,C	2		2	NONE				
06/22/1988	760	2	A,C	2		2	NONE				
06/24/1988	449	2	A,C	2		2	NONE				
06/24/1988	587	2	A,B	2		2	NONE				
06/25/1988	1103	1	A,B	2		2	NONE				
06/25/1988	761	1	A,H	2		2	NONE				
06/26/1988	485	1	A,H	2		2	NONE				
06/26/1988	486	1	A,H	2		2	NONE				
06/27/1988	493	2	A,K	2		2	NONE				
06/27/1988	762	2	A,K	2		2	NONE				
06/28/1988	487	2	A,K	2		2	NONE				
06/28/1988	488	2	A,K	2		2	NONE				
06/28/1988	494	2	A,K	2		2	NONE				
06/28/1988	763	2	A,C,G,K	2		2	NONE				
06/29/1988	762	2	A,D	2		2	NONE				
06/30/1988	1104	1	A,D	2		2	NONE				
06/30/1988	1105	1	A,D,K,N	2		2	NONE				
06/30/1988	1105	2	A,H	2		2	NONE				
07/01/1988	497	2	A,H,D,K,N	2		2	NONE				
07/01/1988	536	2	A,H	2		2	NONE				
07/01/1988	1107	2	A,H	2		2	NONE				
07/02/1988	1108	2	A,C,G,K	2		2	NONE				
07/02/1988	763	2	A,C,G,K	2		2	NONE				
07/03/1988	1109	2	A,D	2		2	NONE				
07/05/1988	578	1	A,D	2		2	NONE				
07/07/1988	447	2	A,H	2		2	NONE				
07/07/1988	764	2	A,H	2		2	NONE				
07/08/1988	765	1	A,H	2		2	NONE				
07/09/1988	495	2	A,H	2		2	NONE				
07/12/1988	496	2	A,H	2		2	NONE				
07/12/1988	1111	1	A,H	2		2	NONE				
07/14/1988	766	2	A,H	2		2	NONE				
07/15/1988	498	2	A,D	2		2	NONE				
07/15/1988	499	2	A,D	2		2	NONE				
07/15/1988	537	2	A,C	2		2	NONE				
07/15/1988	767	1	A,C	2		2	NONE				
07/15/1988	1112	1	A,H	2		2	NONE				
07/16/1988	538	2	A,H	2		2	NONE				
07/16/1988	768	2	A,H	2		2	NONE				
07/17/1988	500	2	A,H	2		2	NONE				
07/17/1988	501	2	A,C	2		2	NONE				
07/17/1988	502	1	A,C,G	2		2	NONE				
07/19/1988	503	2	A,H	2		2	NONE				
07/19/1988	1320	2	A,H	2		2	N1 DECREASE				
07/19/1988	539	2	A,H	2		2	NONE				
07/20/1988	540	1	A,B	2		2	NONE				
07/21/1988	504	1	A,B	2		2	NONE				
07/23/1988	505	1	A,H	2		2	NONE				
07/23/1988	541	1	A,H	2		2	NONE				
07/23/1988	542	1	A,H	2		2	NONE				

SOURCE : ENGINE MANUFACTURER

EDATE	EVIS	ENG	POS	ETIME	SIGN_EVI	AIRCRAFT	POF	ALTITUDE	SPEED	FL RULES	LT	COND'S	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
07/23/1988	769	1			NONE	UNKNOWN	TAKEOFF	0	80	RAIN		NONE	NO	SEVERAL		
07/24/1988	543	2		8:15:00	NONE	UNKNOWN	TAKEOFF	200		CLEAR		ATB	NO	NO	NO	
07/25/1988	506	2			INV POW LOSS	UNKNOWN	TAKEOFF	200	140	CLEAR		ATB	NO	NO	NO	
07/26/1988	507	2		22:10:00	INV POW LOSS	UNKNOWN	TAKEOFF	300		CLEAR		ATB	NO	SEVERAL		
07/26/1988	544	1			NONE	UNKNOWN	TAKEOFF	300		CLEAR		ATO	NO	NO	NO	
07/26/1988	545	2		15:20:00	MULT BIRDS	UNKNOWN	TAKEOFF	300		0		0	140	NO	NO	
07/27/1988	546	2			NONE	UNKNOWN	TAKEOFF	300		0		100	NO	NO	NO	
07/28/1988	509	1		15:00:00	NONE	UNKNOWN	APPROACH	200		1500	180	VFR	NO	NO	NO	
07/30/1988	508	2			NONE	UNKNOWN	APPROACH	200		1500	180	VFR	NO	NO	NO	
07/30/1988	510	1			NONE	UNKNOWN	APPROACH	200		1500	180	VFR	NO	NO	NO	
07/30/1988	511	2			NONE	UNKNOWN	APPROACH	200		1500	180	VFR	NO	NO	NO	
08/01/1988	1113	1		14:00:00	NONE	UNKNOWN	LANDING	200		0	90	LANDING	NO	NO	NO	
08/05/1988	547	1			NONE	UNKNOWN	APPROACH	300		1500	180	VFR	NO	NO	NO	
08/05/1988	548	2		17:55:00	NONE	UNKNOWN	LANDING	300		5	130	OVERCAST	NO	NO	NO	
08/05/1988	1114	2			NONE	UNKNOWN	LANDING	300		0		CLEAR	NO	NO	NO	
08/05/1988	1188	2			NONE	UNKNOWN	TAKEOFF	200		0		110	NO	NO	NO	
08/05/1988	512	1			NONE	UNKNOWN	TAKEOFF	200		0		110	VFR	NO	NO	
08/07/1988	513	2		9:46:00	NONE	UNKNOWN	TAKEOFF	200		0		110	VFR	NO	NO	
08/07/1988	770	1			NONE	UNKNOWN	TAKEOFF	200		0		110	VFR	NO	NO	
08/07/1988	1006	2			NONE	UNKNOWN	TAKEOFF	200		0		110	VFR	NO	NO	
08/09/1988	514	2			NONE	UNKNOWN	TAKEOFF	200		0		110	VFR	NO	NO	
08/09/1988	830	2			NONE	UNKNOWN	TAKEOFF	200		0		110	VFR	NO	NO	
08/10/1988	515	1			NONE	UNKNOWN	TAKEOFF	200		0		110	VFR	NO	NO	
08/10/1988	1007	1			NONE	UNKNOWN	TAKEOFF	200		0		110	VFR	NO	NO	
08/11/1988	516	1			NONE	UNKNOWN	TAKEOFF	200		0		110	VFR	NO	NO	
08/12/1988	517	2			NONE	UNKNOWN	TAKEOFF	200		0		110	VFR	NO	NO	
08/12/1988	518	2			NONE	UNKNOWN	TAKEOFF	200		0		120	VFR	NO	NO	
08/13/1988	585	2		7:13:00	NONE	UNKNOWN	TAKEOFF	200		0		123	VFR	NO	NO	
08/13/1988	771	1		8:30:00	NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/13/1988	772	2			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/14/1988	1008	2		19:14:00	NONE	UNKNOWN	LANDING	200		0		125	VFR	NO	NO	
08/14/1988	549	1			NONE	UNKNOWN	LANDING	200		0		125	VFR	NO	NO	
08/14/1988	773	1			NONE	UNKNOWN	LANDING	200		0		125	VFR	NO	NO	
08/15/1988	519	1			NONE	UNKNOWN	LANDING	200		0		125	VFR	NO	NO	
08/15/1988	520	1			NONE	UNKNOWN	LANDING	200		0		125	VFR	NO	NO	
08/15/1988	550	2		21:45:00	MULT BIRDS	UNKNOWN	CRUISE	300		0		125	VFR	NO	NO	
08/15/1988	581	2			NONE	UNKNOWN	CRUISE	300		0		125	VFR	NO	NO	
08/15/1988	774	2			NONE	UNKNOWN	CRUISE	300		0		125	VFR	NO	NO	
08/15/1988	1009	1			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/16/1988	521	2			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/16/1988	551	2			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/17/1988	552	2			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/18/1988	581	2			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/19/1988	582	1			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/19/1988	584	1			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/19/1988	1010	2		15:14:00	NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/19/1988	1011	2			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/21/1988	555	1		8:52:00	NONE	UNKNOWN	LANDING	300		0		125	VFR	NO	NO	
08/21/1988	1012	2			NONE	UNKNOWN	LANDING	300		0		125	VFR	NO	NO	
08/23/1988	523	1		6:18:00	MULT ENG	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/23/1988	523	2			MULT ENG	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/24/1988	1187	2		8:50:00	NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/26/1988	524	1			MULT BIRDS	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/26/1988	556	1			MULT ENG	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/26/1988	556	2			MULT ENG	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/28/1988	775	2			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/29/1988	1013	2			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/29/1988	557	1		8:43:00	MULT ENG-BIRDS	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/29/1988	1014	2			MULT ENG-BIRDS	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/30/1988	525	1			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/30/1988	558	1			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
08/31/1988	776	1		14:30:00	NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
09/01/1988	1186	2			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
09/02/1988	559	1		13:00:00	NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
09/03/1988	560	2			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	
09/03/1988	583	1			NONE	UNKNOWN	TAKEOFF	200		0		125	VFR	NO	NO	

SCIENCE: ENGLISCH

DATE	EVT#	ENG POS	DMG CODE	SEVERITY	PWV LOSS	MAX VIBE	THROTTLE	IFSD	REMARKS
07/23/1988	769	1	A,D	2	NONE	3.0	NO		5 FAN BLADES BLENDON WING
07/24/1988	563	2	A,H	1	COMPRESSOR	HIGH	YES		REPLACED 3 PAIR OF FAN BLADES
07/25/1988	509	2	A,H,I,K	1	COMPRESSOR	5.0	YES		1 F BLADE FRACTURED BELOW MSS
07/26/1988	507	2	A,H	0	NONE	NONE	NO		MOMENTARY THRUST LOSS FOR APPROX. 10 SEC
07/26/1988	564	2	A,B,H	0	NONE	NONE	NO		DOOR IN CABIN, SMALL BIRD
07/26/1988	545	2	A,C,H,K	0	NONE	NONE	NO		SMALL BIRD
07/27/1988	508	2	A,C,H,K	0	NONE	NONE	NO		HPC DAMAGED AND REMOVED
07/28/1988	586	1	A,C,H,K	0	NONE	NONE	NO		BST FOUND HPC STG6 BLD WITH A NICK
07/29/1988	509	1	A	0	NONE	NONE	NO		SMALL BIRD
07/30/1988	546	2	A	0	NONE	NONE	NO		6 FAN BLADES REPLACED
07/30/1988	510	1	A	0	NONE	NONE	NO		SMALL BIRD
08/01/1988	511	2	A	0	NONE	NONE	NO		6 FAN BLADES REPLACED
08/01/1988	1113	1	A,H	0	NONE	2.0	NO		DOOR
08/05/1988	547	1	A	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/05/1988	548	1	A	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/05/1988	1114	2	A	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/05/1988	1188	2	A	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/07/1988	512	1	A	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/07/1988	513	2	A	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/07/1988	770	1	A,H	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/09/1988	514	2	A	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/09/1988	830	2	A	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/10/1988	515	1	A	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/10/1988	1007	1	A,H	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/11/1988	516	1	A	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/12/1988	517	1	A	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/12/1988	518	2	A	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/13/1988	585	2	A	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/13/1988	771	2	A,C,G	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/13/1988	772	2	A,C,G	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/14/1988	549	1	A,C,G	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/14/1988	773	1	A,C,G	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/15/1988	519	1	A,C,G	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/15/1988	520	1	A,D,I	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/15/1988	550	2	A	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/15/1988	581	2	A,C	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/15/1988	774	2	A,C	0	NONE	NONE	NO		4 F BLD UNK DAMAGE
08/15/1988	1009	1	A,B,H	0	COMPRESSOR	5.0	IDLE	NO	5X EPR LOSS
08/16/1988	521	2	A,D	0	NONE	NONE	NO	NO	6 FAN BLADES REPLACED
08/16/1988	521	2	A,D	0	NONE	NONE	NO	NO	6 FAN BLADES REPLACED, FOUND ON GRD INSPEC
08/17/1988	551	1	A	0	NONE	NONE	NO	NO	6 F BLD UNK DAMAGE
08/17/1988	553	1	A	0	NONE	NONE	NO	NO	ODOR IN COCOPIT
08/18/1988	553	1	A	0	NONE	NONE	NO	NO	MOMENTARY INCREASE IN EGT
08/19/1988	522	1	A	0	NONE	NONE	NO	NO	6 F BLD UNK DAMAGE
08/19/1988	522	1	A	0	NONE	NONE	NO	NO	ODOR IN COCOPIT
08/19/1988	1010	2	A,C	0	NONE	NONE	NO	NO	ODOR
08/19/1988	1011	1	A,D	0	NONE	NONE	NO	NO	SOME ABRADABLE MISSING
08/20/1988	523	2	A,D	0	NONE	NONE	NO	NO	REPLACED 5 PAIRS OF FAN BLADES
08/20/1988	523	2	A,D	0	NONE	NONE	NO	NO	27 BIRDS CLEARED FROM RUNWAY
08/20/1988	557	2	A,B,H	0	NONE	NONE	NO	NO	FOUND ON GRD INSPEC
08/20/1988	1014	2	A,B	0	NONE	NONE	NO	NO	1 F BLADE 1/4 INCH TIP CURL, GRD INSPEC
08/20/1988	525	1	A,B	0	NONE	NONE	NO	NO	INGESTED PIECE OF TIRE, ALSO FOUND BIRD
08/21/1988	558	1	A,C	0	NONE	NONE	NO	NO	3 FAN BLADES BLENDON WING
08/21/1988	558	1	A,C	0	NONE	NONE	NO	NO	560
08/22/1988	556	2	A,D	0	NONE	NONE	NO	NO	560
08/23/1988	523	1	A,D	0	NONE	NONE	NO	NO	560
08/24/1988	1187	2	A,D	0	NONE	NONE	NO	NO	560
08/25/1988	524	1	A,D	0	NONE	NONE	NO	NO	560
08/26/1988	524	1	A,D	0	NONE	NONE	NO	NO	560
08/26/1988	556	2	A,D	0	NONE	NONE	NO	NO	560
08/27/1988	773	2	A,D	0	NONE	NONE	NO	NO	560
08/28/1988	1013	2	A,B,H	0	NONE	NONE	NO	NO	560
08/29/1988	557	2	A,B,H	0	NONE	NONE	NO	NO	560
08/29/1988	1014	2	A,B	0	NONE	NONE	NO	NO	560
08/30/1988	525	1	A,B	0	NONE	NONE	NO	NO	560
08/30/1988	1186	2	A,C	0	NONE	NONE	NO	NO	560
08/31/1988	559	1	A,C	0	NONE	NONE	NO	NO	560
09/01/1988	1186	2	A,C	0	NONE	NONE	NO	NO	560
09/02/1988	559	1	A,C	0	NONE	NONE	NO	NO	560
09/03/1988	560	2	A,C	0	NONE	NONE	NO	NO	560
09/03/1988	583	1	A	0	NONE	NONE	NO	NO	560

SOURCE : ENGINE MANUFACTURER

E DATE	EVT#	ENG	POS	ETIME	SIGN_EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL RULES	LT CONDS	WEATHER	CREW AC	CREW AL	BIRD SEE
09/04/1988	529	2		NONE		200	APPROACH	0	60	CLEAR			NONE	NO	NO
09/04/1988	561			NONE		300	UNKNOWN			ATO			ONE	NO	NO
09/04/1988	1015	2		7:16:00	NONE	200	TAKEOFF	0	60	ATB			ATB	NO	NO
09/05/1988	562	1		NONE		300	TAKEOFF	+V1		ATB			ATB	NO	NO
09/05/1988	1017			NONE		200	UNKNOWN			NONE			NONE	NO	NO
09/06/1988	563	2		NONE		300	TAKEOFF			NONE			NONE	NO	NO
09/07/1988	777			NONE		300	TAKEOFF	0		OVERCAST			OVERCAST	NO	NO
09/08/1988	564	2		11:00:00	MULT BIRDS	300	LANDING	0	130	ATB			ATB	NO	NO
09/08/1988	1018			NONE		200	TAKEOFF	0	132	NO			NO	NO	NO
09/09/1988	527	1		8:39:00	NONE	200	LANDING	0	131	NO			NO	NO	NO
09/10/1988	528			NONE		200	TAKEOFF			NO			NO	NO	NO
09/10/1988	565	1		NONE		300	UNKNOWN			SEVERAL			SEVERAL	NO	NO
09/12/1988	778	2		13:40:00	INV POW LOSS	200	APPROACH	2500	245	CLEAR			ATB	NO	NO
09/12/1988	1019			NONE		200	CLIMB	0		NO			NO	YES	SEVERAL
09/14/1988	779	2		NONE		300	UNKNOWN	800		NO			NO	NO	FLOCK
09/14/1988	1016	2		NONE		200	TAKEOFF	0		ATO			ATO	NO	NO
09/14/1988	1020			NONE		200	UNKNOWN			NO			NO		FLOCK
09/15/1988	529	1		9:45:00	MULT ENG-BIRDS	200	TAKEOFF	0	155	CRASHED			CRASHED	YES	NO
09/15/1988	529	2		9:45:00	MULT ENG-BIRDS	200	TAKEOFF	25	150	ATB			ATB	NO	NO
09/15/1988	566			18:50:00	MULT BIRDS	300	TAKEOFF	0	122	NO			NO	NO	SEVERAL
09/15/1988	1021	1		13:55:00	MULT BIRDS	200	TAKEOFF			NO			NO	NO	NO
09/16/1988	567			NONE		300	CRUISE			NO			NO	NO	SEVERAL
09/16/1988	1022	1		8:45:00	NONE	200	TAKEOFF	0	120	ATB			ATB	NO	NO
09/17/1988	579	1		13:00:00	NONE	200	TAKEOFF	1600	160	NO			NO	NO	NO
09/17/1988	780	2		8:17:00	NONE	200	CLIMB	1600	160	NO			NO	NO	NO
09/18/1988	568			NONE		300	LANDING			NO			NO	NO	FLOCK
09/18/1988	1023	1		8:15:00	NONE	200	TAKEOFF	0	80	NO			NO	NO	FLOCK
09/19/1988	781	1		13:14:00	MULT ENG-BIRDS	200	TAKEOFF	30	160	VFR			VFR	NO	NO
09/19/1988	781	2		13:14:00	MULT ENG-BIRDS	200	TAKEOFF	30	160	VFR			VFR	NO	NO
09/20/1988	530	1		NONE		200	UNKNOWN			NO			NO	NO	NO
09/20/1988	569	2		1:25:00	NONE	300	TAXI	0	10	NO			NO	NO	NO
09/20/1988	782	1		8:05:00	NONE	200	TAKEOFF	0	135	NO			NO	NO	NO
09/20/1988	783	2		8:17:00	NONE	200	TAKEOFF	0	80	NO			NO	NO	NO
09/20/1988	784	2		16:24:00	NONE	200	TAKEOFF	0	71	ATB			ATB	NO	YES
09/20/1988	1024	1		NONE		200	UNKNOWN			NO			NO	NO	FLOCK
09/20/1988	1025	1		NONE		200	UNKNOWN			NO			NO	NO	FLOCK
09/21/1988	570	2		NONE		200	UNKNOWN			NO			NO	NO	NO
09/21/1988	570			NONE		200	UNKNOWN			NO			NO	NO	NO
09/21/1988	1026	1		NONE		200	UNKNOWN			NO			NO	NO	NO
09/23/1988	531	2		NONE		200	UNKNOWN			NO			NO	NO	NO
09/23/1988	785	2		NONE		200	UNKNOWN			NO			NO	NO	NO
09/24/1988	571	2		NONE		200	UNKNOWN			NO			NO	NO	NO
09/24/1988	580			NONE		200	UNKNOWN			NO			NO	NO	NO
09/25/1988	572	1		NONE		200	UNKNOWN			NO			NO	NO	NO
09/25/1988	1027	2		NONE		200	UNKNOWN			NO			NO	NO	NO
09/26/1988	1028	2		NONE		200	UNKNOWN			NO			NO	NO	NO
09/26/1988	1028			NONE		200	UNKNOWN			NO			NO	NO	NO
09/26/1988	1029	2		NONE		200	UNKNOWN			NO			NO	NO	NO
09/27/1988	787	1		NONE		200	UNKNOWN			NO			NO	NO	NO
09/27/1988	1028	2		NONE		200	UNKNOWN			NO			NO	NO	NO
09/28/1988	788	2		NONE		200	UNKNOWN			NO			NO	NO	NO
09/28/1988	1029	2		NONE		200	UNKNOWN			NO			NO	NO	NO
09/29/1988	789	2		NONE		200	UNKNOWN			NO			NO	NO	NO
09/30/1988	575	2		NONE		200	UNKNOWN			NO			NO	NO	NO
10/01/1988	697	1		NONE		200	UNKNOWN			NO			NO	NO	NO
10/02/1988	698	2		NONE		200	UNKNOWN			NO			NO	NO	NO
10/02/1988	790	1		MULT ENG-BIRDS		200	UNKNOWN			NO			NO	NO	NO
10/02/1988	790	2		MULT ENG-BIRDS		200	UNKNOWN			NO			NO	NO	NO
10/02/1988	831	1		NONE		200	UNKNOWN			NO			NO	NO	NO
10/03/1988	699	2		NONE		200	UNKNOWN			NO			NO	NO	NO
10/04/1988	1030	1		NONE		200	UNKNOWN			NO			NO	NO	NO
10/05/1988	1031	1		NONE		200	UNKNOWN			NO			NO	NO	NO
10/06/1988	832	2		NONE		200	UNKNOWN			NO			NO	NO	NO
10/07/1988	1032	1		NONE		200	UNKNOWN			NO			NO	NO	FLOCK

SOURCE : ENGINE MANUFACTURER	EDATE	EVN #	ENG POS	BIRD NAME	BIRD SPE #	BIRDS WT	02	1	CITY	PRS	AIRPORT	LOCALE	US INCID	ENGINE DASH	
	09/04/1988	526	2	KITE*	1	YYZ-YAM	YAM		SAULT ST MARIE, CANADA		PA	NO YES	J180	9A	
	09/04/1988	561	1	KITE*	1	YYZ-PIT	AND	INDIA	AHMEDABAD, INDIA		CHICAGO, ILL-OHARE	NO NO	CFM56	3	
	09/04/1988	1015	2	KITE*	1	IXV-UDR	RND	INDIA	CHICAGO, ILL-OHARE		INDIA	YES YES	CFM56	3	
	09/05/1988	562	1	GULL*	1	MMY-OKA	MHY	NEV	RENO, NEV		IRELAND	NO NO	CFM56	3	
	09/05/1988	1017		HADADA IBIS	6112	PAI-IKO	BFS	JAPAN	MIYAKO JIMA, JAPAN		IRELAND	NO NO	CFM56	3	
	09/05/1988	1018		VULTURE*	1	PAT-KO	PAI	INDIA	BELFAST, N. IRELAND		INDIA	NO NO	CFM56	3	
	09/05/1988	563	2	VULTURE*	1	CPT-PLZ	PLZ	S. AFRICA	BATNA, INDIA		PORT ELIZABETH, S. AFRICA	NO NO	CFM56	3	
	09/05/1988	777	2	VULTURE*	1	XMN	XMN	CHINA	XIAMEN, CHINA		ENGLAND	NO NO	CFM56	3	
	09/06/1988	564	2	VULTURE*	1	-LGW	DEL	INDIA	DEHLI, INDIA		INDIA	NO NO	CFM56	3	
	09/06/1988	1018		VULTURE*	1	TRV	TRV	INDIA	TRIVANDRUM, INDIA		INDIA	NO YES	CFM56	3	
	09/06/1988	779	2	VULTURE*	1	PHL	PHL	INDIA	PHILA, PA		INDIA	NO NO	CFM56	3	
	09/06/1988	1016	2	SPCKLED PIGEON	2P4	11-5	BJR-ASH	BJR	INDIA	AHMEDABAD, INDIA		INDIA	NO NO	CFM56	3
	09/06/1988	1020	1	SPCKLED PIGEON	2P4	6	11-5	BJR-ASM	BJR	BAHAR DAR, ETHIOPIA		BAHAR DAR, ETHIOPIA	NO NO	CFM56	3
	09/06/1988	529	1	LAPWING*	1	BFS	BFS	IRELAND	BELFAST, N. IRELAND		IRELAND	NO NO	CFM56	3	
	09/06/1988	529	2	LAPWING*	1	VNS-HJR	VAS	INDIA	VARANASI, INDIA		INDIA	NO NO	CFM56	3	
	09/06/1988	1016	1	WOOD PIGEON	2P9	1	ZAG-ZRH	ZRH	SWITZERLAND	YUGOSLAVIA		SWITZERLAND	NO NO	CFM56	3
	09/06/1988	1016	2	KITE*	1	HYD-HYD	HYD	INDIA	HYDERABAD, INDIA		INDIA	NO NO	CFM56	3	
	09/06/1988	1016	1	KITE*	1	MDW-MDW	MDW	INDIA	CHICAGO, ILL-MIDWAY		INDIA	NO NO	CFM56	3	
	09/06/1988	579	2	WOOD PIGEON	2P9	1	HAA-TRZ	HAA	INDIA	MADRAS, INDIA		INDIA	NO NO	CFM56	3
	09/06/1988	1016	1	KITE*	1	LHR	LHR	INDIA	LONDON-HEATHROW, ENGLAND		ENGLAND	NO NO	CFM56	3	
	09/06/1988	579	1	WOOD PIGEON	2P9	1	IWX	IWX	INDIA	LURANGABAD, INDIA		INDIA	NO NO	CFM56	3
	09/06/1988	1016	2	KITE*	1	BUD-MUC	BUD	HUNGARY	BUDAPEST, HUNGARY		HUNGARY	NO NO	CFM56	3	
	09/06/1988	579	2	WOOD PIGEON	2P9	1	BUD-MUC	BUD	HUNGARY	BUDAPEST, HUNGARY		HUNGARY	NO NO	CFM56	3
	09/06/1988	1016	1	KITE*	1	YQT-YYC	YQT	CANADA	CANADA		CANADA	NO NO	CFM56	3	
	09/07/1988	780	2	BARRED DOVE	2P102	1	2.	GOT	GOTHENBURG	SWEDEN		SWEDEN	NO NO	CFM56	3
	09/07/1988	568	1	BARRED DOVE	2P102	1	10.	LIN-DUS	MILAN, ITALY		ITALY	NO NO	CFM56	3	
	09/07/1988	1023	1	BARRED DOVE	2P102	1	1SG-BHY	ISHIGAKI, JAPAN		JAPAN	NO NO	CFM56	3		
	09/07/1988	781	1	BARRED DOVE	2P102	1	LKG-BOM	LKG	LUCKNOW, INDIA	LUCKNOW, INDIA		INDIA	NO NO	CFM56	3
	09/07/1988	1024	1	BARRED DOVE	2P102	1	VNS-LKO	LAS	INDIA	INDIA		INDIA	NO NO	CFM56	3
	09/07/1988	1025	1	BARRED DOVE	2P102	1	OKA-MHY	LAS	INDIA	INDIA		INDIA	NO NO	CFM56	3
	09/07/1988	1026	1	BARRED DOVE	2P102	1	STL-HOU	MO-TEX	INDIA	INDIA		INDIA	NO NO	CFM56	3
	09/07/1988	1026	2	BARRED DOVE	2P102	1	10.	CRL	CHARLESTON, W. VA		USA	YES YES	CFM56	3	
	09/07/1988	570	1	BARRED DOVE	2P102	1	LAX	LOS ANGELES, CA		CA	NO NO	CFM56	3		
	09/07/1988	570	2	BARRED DOVE	2P102	1	KRT-PZU	KRT	INDIA	INDIA		INDIA	NO NO	CFM56	3
	09/07/1988	571	1	BARRED DOVE	2P102	1	BRS-IC1	BRS	KHARTOUM, SUDAN	SUDAN		SUDAN	NO NO	CFM56	3
	09/07/1988	571	2	BARRED DOVE	2P102	1	MEL	MEL	BRISBANE, ENGLAND	BRISBANE, ENGLAND		ENGLAND	NO NO	CFM56	3
	09/07/1988	571	1	BARRED DOVE	2P102	1	HND-YGJ	JAPAN	MELBOURNE, AUSTRALIA	MELBOURNE, AUSTRALIA		AUSTRALIA	NO NO	CFM56	3
	09/07/1988	572	1	BARRED DOVE	2P102	1	-DAL	TEX	ALONG, INDIA	ALONG, INDIA		INDIA	NO NO	CFM56	3
	09/07/1988	572	2	BARRED DOVE	2P102	1	JDH-JAI	JAI	PHOENIX, AZ	PHOENIX, AZ		USA	YES YES	CFM56	3
	09/07/1988	573	1	BARRED DOVE	2P102	1	BOM-1XV	1XV	BUENOS AIRES, ARGENTINA	BUENOS AIRES, ARGENTINA		ARGENTINA	NO NO	CFM56	3
	09/07/1988	573	2	BARRED DOVE	2P102	1	-FRA	FRA	FRANKFURT, GERMANY	FRANKFURT, GERMANY		GERMANY	NO YES	CFM56	3
	09/07/1988	574	1	HERRING GULL	14M14	2	JDH-JAI	JAI	JAIPUR, INDIA	JAIPUR, INDIA		INDIA	NO NO	CFM56	3
	09/07/1988	574	2	HERRING GULL	14M14	2	BOM-1XV	1XV	BUENOS AIRES, ARGENTINA	BUENOS AIRES, ARGENTINA		ARGENTINA	NO NO	CFM56	3
	09/07/1988	575	1	HERRING GULL	14M14	2	-FRA	FRA	QUEBEC, CANADA	QUEBEC, CANADA		CANADA	NO NO	CFM56	3
	09/07/1988	575	2	HERRING GULL	14M14	2	STR-FRA	STR	STUTTGART, GERMANY	STUTTGART, GERMANY		GERMANY	NO NO	CFM56	3
	09/07/1988	576	1	HERRING GULL	14M14	2	-PIT	PIT	PITTSBURGH, PA	PITTSBURGH, PA		PA	YES YES	CFM56	3
	09/07/1988	576	2	HERRING GULL	14M14	2	IXC-IXJ	IXJ	JAMMU, INDIA	JAMMU, INDIA		INDIA	NO NO	CFM56	3
	09/07/1988	577	1	HERRING GULL	14M14	2	JKO-LKO	LKO	LUCKNOW, INDIA	LUCKNOW, INDIA		INDIA	NO NO	CFM56	3
	09/07/1988	577	2	HERRING GULL	14M14	2	YUL-VNS	VNS	VIENNA, AUSTRIA	VIENNA, AUSTRIA		AUSTRIA	NO NO	CFM56	3
	09/07/1988	578	1	HERRING GULL	14M14	2	YUL-VNS	VNS	VARANASI, INDIA	VARANASI, INDIA		INDIA	NO NO	CFM56	3
	09/07/1988	579	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	580	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	580	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	581	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	581	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	582	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	582	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	583	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	583	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	584	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	584	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	585	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	585	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	586	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	586	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	587	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	587	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	588	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	588	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	589	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	589	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	590	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	590	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	591	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	591	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	592	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	592	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	593	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	593	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	594	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	594	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	595	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	595	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	596	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	596	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	597	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	597	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	598	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	598	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	599	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	599	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	600	1	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	600	2	HERRING GULL	14M14	2	YUL-VNS	VNS	YUL, YUL	YUL, YUL		INDIA	NO NO	CFM56	3
	09/07/1988	601	1	HERRING GULL	14M14	2	YUL-VNS								

SOURCE : ENGINE MANUFACTURER

E DATE	EVT#	ENG	POS	DMG_CODE	SEVERITY	POM LOSS	MAX VIBE	THROTTLE	IFSD	REMARKS
09/04/1988	526	2			9	NONE	9	NO	NO	REPLACED 4 PAIRS OF FAN BLADES FOUND ON GRD INSPEC
09/04/1988	561	1			9	NONE	9	NO	NO	
09/04/1988	1015	2			9	NONE	9	NO	NO	
09/05/1988	562		A		9	NONE	9	NO	NO	
09/05/1988	1017	1			9	NONE	9	NO	NO	
09/06/1988	563	2			9	NONE	9	NO	NO	
09/07/1988	777	2			9	NONE	9	NO	NO	LPC + HPC DAMAGE
09/08/1988	564	2	A, H	A, I, K	9	NO	9	NO	NO	
09/08/1988	1018	1	A, D, H	A, C	2	3	1	NO	NO	
09/09/1988	527		A, C		2	3	0	NO	NO	
09/10/1988	528	1			2	3	0	NO	NO	PARAMETER DECAY, 1 ST GVANE DISLOOGED
09/10/1988	565	1	A, D, G, K	A, D, G, K	2	3	1	NO	NO	
09/11/1988	778	2	A, D, G, K	A, D, G, K	2	3	1	NO	NO	INVOLUNTARY EGT OVER TEMP LIGHT CAME ON, LOUD BANG
09/12/1988	529	2	A, D, G, K	A, D, G, K	2	3	1	NO	NO	
09/12/1988	1019	1	A, D, G, K	A, D, G, K	2	3	1	NO	NO	
09/12/1988	1207	2	A		2	3	0	NO	NO	
09/13/1988	779	2	A		2	3	0	NO	NO	
09/14/1988	566	2	A, D, G, K	A, D, G, K	2	3	1	NO	NO	
09/14/1988	1016	2	A, D, G, K	A, D, G, K	2	3	1	NO	NO	
09/15/1988	1020	1	A, D, G, K	A, D, G, K	2	3	1	NO	NO	
09/15/1988	529	2	A, D, G, K	A, D, G, K	2	3	1	NO	NO	
09/15/1988	566	1	A, H	A, H	2	3	1	NO	NO	
09/15/1988	1021	1	A, H	A, H	2	3	1	NO	NO	
09/16/1988	567	1	A, D	A, D	2	3	1	NO	NO	
09/16/1988	1022	1	A, D	A, D	2	3	1	NO	NO	
09/17/1988	579	1	A, G	A, G	2	3	1	NO	NO	
09/17/1988	780	2	A, G	A, G	2	3	1	NO	NO	
09/18/1988	568	1	A, D, G, K	A, D, G, K	2	3	1	NO	NO	
09/18/1988	1023	1	A, G	A, G	2	3	1	NO	NO	
09/19/1988	781	1	A, G	A, G	2	3	1	NO	NO	
09/19/1988	781	2	A, G	A, G	2	3	1	NO	NO	
09/20/1988	530	1	A, G	A, G	2	3	1	NO	NO	
09/20/1988	569	1	A, G	A, G	2	3	1	NO	NO	
09/20/1988	782	1	A, G	A, G	2	3	1	NO	NO	
09/20/1988	783	2	A, G	A, G	2	3	1	NO	NO	
09/20/1988	784	1	A, G	A, G	2	3	1	NO	NO	
09/20/1988	1024	1	A, G	A, G	2	3	1	NO	NO	
09/20/1988	1025	1	A, G	A, G	2	3	1	NO	NO	
09/20/1988	570	1	A, H	A, H	2	3	1	NO	NO	
09/21/1988	570	1	A, H	A, H	2	3	1	NO	NO	
09/23/1988	531	2	A, H	A, H	2	3	1	NO	NO	
09/23/1988	785	2	A, H	A, H	2	3	1	NO	NO	
09/24/1988	571	2	A, K	A, K	2	3	1	NO	NO	
09/24/1988	580	1	A, K	A, K	2	3	1	NO	NO	
09/25/1988	572	1	A, K	A, K	2	3	1	NO	NO	
09/25/1988	1027	2	A, K	A, K	2	3	1	NO	NO	
09/25/1988	1185	1	A, G	A, G	2	3	1	NO	NO	
09/26/1988	532	1	A, H	A, H	2	3	1	NO	NO	
09/26/1988	573	1	A, H	A, H	2	3	1	NO	NO	
09/26/1988	786	2	A, B	A, B	2	3	1	NO	NO	
09/27/1988	574	1	A, B	A, B	2	3	1	NO	NO	
09/27/1988	787	1	A, B	A, B	2	3	1	NO	NO	
09/27/1988	1028	2	A, G	A, G	2	3	1	NO	NO	
09/28/1988	788	1	A, G	A, G	2	3	1	NO	NO	
09/28/1988	1029	2	A, I	A, I	2	3	1	NO	NO	
09/29/1988	789	2	A, I	A, I	2	3	1	NO	NO	HPC BLADES BEYOND MM LIMITS
09/30/1988	575	1	A, C, K	A, C, K	2	3	1	NO	NO	FOUND DURING GROUND INSPECTION
10/01/1988	697	2	A, H	A, H	2	3	1	NO	NO	3 FAN BLADES DAMAGED
10/02/1988	698	2	A, H	A, H	2	3	1	NO	NO	FOUND ON GRD INSPEC
10/02/1988	790	2	A, G, K	A, G, K	2	3	1	NO	NO	FAN RUB STRIP GOUGED, 1+2 STG F BLDs REP
10/03/1988	831	1	A, H	A, H	2	3	1	NO	NO	FOUND ON GRD INSPEC., 3 F BLDs SHINGLED
10/04/1988	699	2	A, H	A, H	2	3	1	NO	NO	1 F BLD SHINGLED
10/05/1988	1030	1			2	3	0	NO	NO	
10/06/1988	832	2			2	3	0	NO	NO	
10/07/1988	1032	1			2	3	0	NO	NO	
10/07/1988	1032	1			2	3	0	NO	NO	

SOURCE : ENGINE MANUFACTURER	EVT#	ENG	POS	ELINE	SIGN	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL_RULES	LT_COND	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
10/08/1988	1033	1			NONE		TAKEOFF	ATB	0	VR				NO	NO	SEVERAL
10/08/1988	1034	1			NONE		LANDING	NONE	200	0				NO	NO	NO
10/08/1988	1035	1			MULT	ENG	LANDING	NONE	200					SEVERAL	NO	NO
10/08/1988	1035	2			MULT	ENG	LANDING	NONE	200					SEVERAL	NO	NO
10/10/1988	792	2			NONE		UNKNOWN	NONE	200					SEVERAL	NO	NO
10/12/1988	793	2			NONE		APPROACH	NONE	300					NO	NO	NO
10/13/1988	700	2			NONE		UNKNOWN	NONE	300					YES	NO	SEVERAL
10/15/1988	1036	1			NONE		LANDING	NONE	200	0	120			NO	NO	NO
10/17/1988	701	2			NONE		TAKEOFF	NONE	300					NO	NO	NO
10/19/1988	794	2			NONE		LANDING	NONE	200					NO	NO	NO
10/20/1988	1183	2			14:40:00	ENG	APPROACH	NONE	200					NO	NO	NO
10/20/1988	1184	2			17:50:00	MULT	LANDING	NONE	200	0	120			NO	NO	NO
10/21/1988	795	1			21:00:00	ENG	TAKEOFF	NONE	200	0	80			NO	NO	NO
10/22/1988	1037	1			20:25:00	ENG	UNKNOWN	NONE	200					YES	NO	NO
10/23/1988	833	1			19:27:00	MULT	BIRDS	NONE	200					NO	NO	NO
10/23/1988	1182	1			NONE		LANDING	NONE	200					NO	NO	NO
10/24/1988	798	2			NONE		UNKNOWN	NONE	200					NO	NO	NO
10/24/1988	1209	2			NONE		UNKNOWN	NONE	200					NO	NO	NO
10/26/1988	702	2			8:00:00	ENG	TAKEOFF	NONE	300	0	130			NO	NO	NO
10/26/1988	703	2			NONE		UNKNOWN	NONE	300					NO	NO	NO
10/26/1988	704	2			NONE		TAKEOFF	NONE	300					NO	NO	NO
10/28/1988	799	1			9:00:00	ENG	LANDING	NONE	200	0	110			NO	NO	NO
10/28/1988	1038	2			10:30:00	ENG	TAKEOFF	NONE	300	0	130			NO	NO	NO
10/30/1988	800	2			9:10:00	ENG	LANDING	NONE	200					NO	NO	NO
11/02/1988	801	2			21:35:00	MULT	BIRDS	NONE	200					NO	NO	NO
11/03/1988	705	2			7:50:00	MULT	BIRDS	NONE	200					NO	NO	NO
11/03/1988	706	2			20:00:00	ENG	TAKEOFF	NONE	300	0	140			NO	NO	NO
11/04/1988	1039	1			NONE		UNKNOWN	NONE	200					NO	NO	NO
11/05/1988	802	1			NONE		TAKEOFF	NONE	300	0	130			NO	NO	NO
11/07/1988	796	2			6:30:00	ENG	LANDING	NONE	200	0	150			NO	NO	NO
11/07/1988	706	2			NONE		TAKEOFF	NONE	300	0	150			NO	NO	NO
11/07/1988	804	2			9:15:00	MULT	BIRDS	NONE	200					NO	NO	NO
11/09/1988	834	1			NONE		TAKEOFF	NONE	200					NO	NO	NO
11/09/1988	805	1			NONE		TAKEOFF	NONE	200					NO	NO	NO
11/10/1988	806	1			NONE		CLIMB	NONE	200					NO	NO	NO
11/10/1988	807	1			NONE		TAKEOFF	NONE	200					NO	NO	NO
11/10/1988	835	2			NONE		CLIMB	NONE	200					NO	NO	NO
11/14/1988	708	1			18:45:00	ENG	APPROACH	NONE	300					NO	NO	NO
11/16/1988	808	1			NONE		UNKNOWN	NONE	200					NO	NO	NO
11/17/1988	809	2			NONE		TAKEOFF	NONE	300	0	130			NO	NO	NO
11/18/1988	1040	1			NONE		LANDING	NONE	200					NO	NO	NO
11/18/1988	836	2			NONE		UNKNOWN	NONE	200					NO	NO	NO
11/18/1988	837	2			7:43:00	MULT	BIRDS	NONE	200					NO	NO	NO
11/19/1988	810	1			NONE		TAKEOFF	NONE	200	0	130			NO	NO	NO
11/19/1988	807	1			NONE		LANDING	NONE	200	0	130			NO	NO	NO
11/19/1988	838	2			NONE		TAKEOFF	NONE	200	0	130			NO	NO	NO
11/20/1988	711	2			NONE		UNKNOWN	NONE	200					NO	NO	NO
11/21/1988	811	1			NONE		TAKEOFF	NONE	200	0	130			NO	NO	NO
11/21/1988	712	1			NONE		TAKEOFF	NONE	200	0	130			NO	NO	NO
11/22/1988	813	2			NONE		CLIMB	NONE	200	0	130			NO	NO	NO
11/22/1988	713	2			NONE		TAKEOFF	NONE	200	0	130			NO	NO	NO
11/23/1988	814	1			NONE		TAKEOFF	NONE	200	0	130			NO	NO	NO
11/24/1988	715	2			NONE		TAKEOFF	NONE	200	0	130			NO	NO	NO
11/25/1988	815	1			NONE		CLIMB	NONE	200	0	130			NO	NO	NO
11/25/1988	840	2			NONE		TAKEOFF	NONE	200	0	130			NO	NO	NO
11/26/1988	841	2			7:45:00	MULT	BIRDS	NONE	200	0	160			NO	NO	NO
11/27/1988	816	1			NONE		TAKEOFF	NONE	200	0	123			NO	NO	NO
11/28/1988	817	1			9:00:00	MULT	BIRDS	NONE	200	0	130			NO	NO	NO
11/29/1988	818	2			NONE		TAKEOFF	NONE	200	0	130			NO	NO	NO
11/30/1988	819	2			NONE		LANDING	NONE	200	0	128			NO	NO	NO
12/01/1988	820	1			NONE		TAKEOFF	NONE	200	0	128			NO	NO	NO
12/02/1988	821	1			NONE		TAKEOFF	NONE	200	0	128			NO	NO	NO
12/03/1988	822	1			NONE		TAKEOFF	NONE	200	0	128			NO	NO	NO
12/04/1988	823	1			NONE		TAKEOFF	NONE	200	0	128			NO	NO	NO
12/05/1988	824	1			NONE		TAKEOFF	NONE	200	0	128			NO	NO	NO
12/06/1988	825	1			NONE		TAKEOFF	NONE	200	0	128			NO	NO	NO
12/07/1988	826	1			NONE		TAKEOFF	NONE	200	0	128			NO	NO	NO
12/08/1988	827	1			NONE		TAKEOFF	NONE	200	0	128			NO	NO	NO
12/09/1988	828	1			NONE		TAKEOFF	NONE	200	0	128			NO	NO	NO
12/10/1988	829	1			NONE		TAKEOFF	NONE	200	0	128			NO	NO	NO
12/11/1988	716	2			NONE		TAKEOFF	NONE	200	0	128			NO	NO	NO
12/11/1988	717	1			NONE		TAKEOFF	NONE	200	0	128			NO	NO	NO
12/11/1988	718	2			NONE		TAKEOFF	NONE	200	0	128			NO	NO	NO
12/11/1988	842	1			NONE		TAKEOFF	NONE	200	0	128			NO	NO	NO

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	BIRD_NAM	BIRD_SPE	#_BIRDS	WT_OZ_1	CTY_PRS	AIRPORT	LOCALE	US_INCID	ENGINE DASH
10/08/1988	1033	1			1		DEL-LKO	AGR LKO	AGRA, INDIA	NO	JT80 17
10/08/1988	1034	1							LUCKNOW, INDIA	NO	JT80 17
10/08/1983	1035	1							INDIA	NO	JT80 9A
10/08/1988	1035	2	MOURNING DOVE		2P105		4.	-DAL	DALLAS, TX	YES	JT80 9A
10/10/1988	793	2	WHITE-THROATED SWIFT		1U71		1	YLW-YVR	PHOENIX, AZ	YES	CFM56 3
10/13/1988	700	2	COMMON SONG THRUST		412282		1	-PHX	BHOPAL, INDIA	NO	JT80 9A
10/15/1988	1036	1	SNOW GOOSE		2J26		1	IDR-BHO	PARIS, FRANCE	NO	CFM56 3
10/17/1988	701	2					1	2-3 ORY	HAY RIVER, CANADA	NO	JT80 9A
10/19/1988	794	2					1	203. YZF-YHY	TUCUMAN, ARGENTINA	NO	JT80 9A
10/20/1988	1183	2	GULL*					TUC	SANTA FÉ, ARGENTINA	NO	JT80 9A
10/22/1988	1184	2	GULL*					SFN	DURBAN, S. AFRICA	NO	JT80 9A
10/22/1988	795	1	GULL*				1	DEL-MMD	AHMEDABAD, INDIA	NO	JT80 9A
10/23/1988	1037	1	GULL*				1	AMD-SLL-MCT	SALALAH, OMAN	NO	JT80 15
10/23/1988	833	1	HORNED LARK		17274	1	1.5	SLL-MCT	TX	YES	JT80 9A
10/24/1988	1182	1							JAPAN	YES	JT80 17
10/24/1988	798	1								NO	JT80 15
10/26/1988	1209	2							CURITIBA, BRAZIL	NO	CFM56 3
10/26/1988	702	2							DALLAS/FORT WORTH, TX	YES	CFM56 3
10/26/1988	703	1							OKLAHOMA CITY, OK	YES	CFM56 3
10/28/1988	704	1	KITE*						JAPAN	NO	JT80 17
10/28/1988	799	1							BANGALORE, INDIA	NO	JT80 9A
10/31/1988	1038	2							PATNA, INDIA	NO	JT80 17
11/02/1988	800	2	BLACK PARTRIDGE		4L44		1	MAA-BLR	EAST MIDLANDS, ENGLAND	NO	JT80 15
11/03/1988	801	2						BLR-PNA	PORTO VELHO, BRAZIL	NO	CFM56 3
11/03/1988	705	2						PHN-DEL	HYDERABAD, INDIA	NO	JT80 9A
11/04/1988	1039	1						PHN-EMA	TAIWAN	NO	JT80 9A
11/05/1988	802	1						PHN-EMA-ACE	BIRMINGHAM, AL	YES	CFM56 3
11/05/1988	803	1	HAWK*					PHN-HAF	MIDLAND/ODESSA, TX	YES	CFM56 3
11/07/1988	706	1	COMMON LAPWING		SN1		1	PHN-AMS	AMSTERDAM, NETHERLANDS	NO	CFM56 3
11/07/1988	707	2	BROWN-HOODED GULL		14N35		1	PHN-BDE	MAR DEL PLATA, ARGENTINA	NO	CFM56 3
11/07/1988	804	2					1	MDQ-MDP	MINDIANA, INDONESIA	NO	JT80 9A
11/09/1988	834	1					1	SRQ-TPA	SARASOTA, FL	NO	JT80 7B
11/09/1988	805	1					1	SRQ-JNB	BLOEMFONTEIN, S. AFRICA	NO	JT80 17A
11/09/1988	806	1					1	BFN-BFW	OTTAWA, CANADA	NO	JT80 9A
11/12/1988	807	1					1	YOW-YYZ	BAHIA BLANCA, ARGENTINA	NO	JT80 9A
11/13/1988	835	2					1	YOW-YZZ	LONDON-GATWICK, ENGLAND	NO	CFM56 3
11/14/1988	708	1					1	BHI-LGW	MO-CO	YES	JT80 17
11/16/1988	808	1					1	BHI-LGW	DAY-ORD	YES	JT80 7B
11/17/1988	809	2					1	BHI-LGW	OH-IL	NO	JT80 17
11/17/1988	1040	1					1	BMA-BLR	BANGALORE, INDIA	NO	JT80 17
11/18/1988	836	2								NO	JT80 15
11/18/1988	837	2	GULL*							NO	JT80 15
11/19/1988	810	1	AMERICAN WIGEON		2J71		1	CGN-HAM	HAMBURG, GERMANY	NO	JT80 17A
11/19/1988	1041	1					1	PDX-PDX	BELO HORIZONTE, BRAZIL	NO	CFM56 3
11/20/1988	838	2	GULL*				1	IWX-UDR	UDAIPUR, INDIA	NO	JT80 15
11/20/1988	709	1	BURROWING OWL		2S102		1	GRZ-CMB	GRAZ, AUSTRIA	NO	JT80 17
11/22/1988	710	2					1	CMB-TRZ	CURITIBA, BRAZIL	NO	CFM56 3
11/23/1988	711	2	STARLING*				1	PIE-BHZ	TAMPA/St PETERSBURG, FL	YES	CFM56 3
11/24/1988	811	1					1	-HR	BELO MEDITERRANEAN SEA	NO	CFM56 3
11/24/1988	1042	1					1	CMB-TRZ	COLOMBO, SRI LANKA	NO	JT80 17
11/24/1988	1205	2					1	CMB-TRZ	LONDON-HEATHROW, ENGLAND	NO	CFM56 3
11/25/1988	812	1	STARLING*				1	CPT-PLZ	PORT ELIZABETH, S. AFRICA	NO	JT80 17A
11/25/1988	813	2					1	DEL-ELS	EAST LONDON, S. AFRICA	NO	JT80 17A
11/26/1988	814	1	STARLING*				1	DEL-ELS	MALTA MEDITERRANEAN SEA	NO	CFM56 3
11/26/1988	1043	1					1	GRZ-CMB	NETHERLANDS	NO	CFM56 3
11/27/1988	815	1	Owl*				1	GRZ-CMB	BRUSSELS, BELGIUM	NO	CFM56 3
11/27/1988	816	2	HADADA IBIS		6112		1	LST-BHI	LAUNCHESIÓN, AUSTRALIA	NO	CFM56 3
11/29/1988	839	2	BLACK-HEADED GULL		14N36		1	BHI-BHI	BAHIA BLANCA, ARGENTINA	NO	JT80 15A
11/30/1988	713	2	HERRING GULL		14N14		1	BHI-BHI	FRANKFURT, GERMANY	NO	CFM56 3
12/01/1988	814	1	GULL*				1	BHI-BHI	DUSSELDORF, GERMANY	NO	CFM56 3
12/04/1988	714	1					1	BHI-BHI	AMSTERDAM, NETHERLANDS	NO	CFM56 3
12/05/1988	815	1	GULL*				1	BHI-BHI	BAHIA BLANCA, ARGENTINA	NO	JT80 9A
12/05/1988	840	2					1	BHI-BHI	GREENVILLE, SC, USA	NO	JT80 15
12/07/1988	841	2	GULL*				1	BHI-BHI	TOKYO-HANEDA, JAPAN	YES	CFM56 3
12/07/1988	715	2					1	BHI-BHI	FRANKFURT, GERMANY	NO	CFM56 3
12/07/1988	716	1					1	BHI-BHI	DUSSELDORF, GERMANY	NO	CFM56 3
12/07/1988	717	1	GULL*				1	BHI-BHI	AMSTERDAM, NETHERLANDS	NO	CFM56 3
12/11/1988	718	2	COMMON LAPWING		SN1		1	DUS-TFS	BAHIA BLANCA, ARGENTINA	NO	JT80 9A
12/11/1988	842	1	BROWN-HOODED GULL		14N35		1	DUS-TFS	BAHIA BLANCA, ARGENTINA	NO	JT80 9A

SOURCE : ENGINE MANUFACTURER

EVT#	ENG	POS	DNG	CODE	SEVERITY	PW LOSS	MAX VIBE	THROTTLE	IFSD	REMARKS
10/08/1988	1033	1			9	NONE	NONE	NONE	NO	NO
10/08/1988	1034	1			9	NONE	NONE	NONE	NO	NO
10/08/1988	1035	1			9	NONE	NONE	NONE	NO	NO
10/08/1988	1035	2			9	NONE	NONE	NONE	NO	NO
10/10/1988	792	2			9	NONE	NONE	NONE	NO	NO
10/12/1988	793	2			9	NONE	NONE	NONE	NO	NO
10/13/1988	700	2			9	NONE	NONE	NONE	NO	NO
10/15/1988	1036	1	A,C		9	NONE	NONE	NONE	NO	NO
10/17/1988	701	2	A,D		9	NONE	NONE	NONE	NO	NO
10/19/1988	794	2	A,I,K		1	COMPRESSOR	HIGH	NONE	NO	1 F BLD BENT
10/20/1988	1183	2			9	NONE	NONE	NONE	NO	1 STG FAN ASSEMBLY CHANGED
10/21/1988	795	1	A,D		2				NO	10 OTHER FBLS SEVERE DAM, DAN THRU COMP
10/23/1988	833	1	A,I,K		2				NO	FOUND ON GRD INSPEC
10/24/1988	1182	1			9	NONE	NONE	NONE	NO	BENT F BLD, REPLACED FAN ASSEMBLY
10/24/1988	798	1	A,D		2				NO	S F BLD SHINGLED
10/26/1988	1209	2	A,H		2				NO	'LOUD VIBRATING SOUND' FROM ENGINE
10/26/1988	703	2	A,D		2				NO	
10/28/1988	704	2			2				NO	
10/28/1988	799	1			2				NO	
10/31/1988	1038	2	A,D,G		2				NO	
10/31/1988	800	2	A,D,H,N		2	COMPRESSOR	IDLE		NO	ENGINE CHANGE, 1STG F BLDs REPLACED
10/31/1988	801	2	A,C		2				NO	'ENG SURGED TWICE ON POW RED
11/02/1988	705	2			2				NO	
11/03/1988	1039	1	A,C		2				NO	
11/04/1988	1039	1	A,C		2				NO	
11/05/1988	802	1	A,D,H		2				NO	1 F BLD CHANGED
11/07/1988	706	1	A,D,H		2				NO	LOUD BANG AT LIFT OFF
11/07/1988	707	2	A,I,K		2				NO	3 FAN OGV'S DAMAGED
11/07/1988	804	2			2				NO	7 F BLDs WITH TRAILING EDGE TIP CURL
11/07/1988	834	1			2				NO	SEVERE GAS PATH DAMAGE
11/09/1988	805	1	A,E,G,K		1	COMPRESSOR			NO	
11/09/1988	806	1			1				NO	AC SWUNG TO LEFT, DAMAGE THRU GAS PATH
11/12/1988	807	1	A,C,K		1				NO	ODOR IN CABIN
11/13/1988	835	2			1				NO	SMALL DAM IN 13TH STG COMP
11/14/1988	708	1			1				NO	
11/16/1988	808	1	A,G		1				NO	FOUND ON GRD INSPEC, C1+C2 DAMAGE
11/17/1988	809	2	A,D		1				NO	FOUND ON GRD INSPEC, C1 DISK+BLDs REPLACED
11/17/1988	1040	1			1				NO	LPC DAMAGE
11/18/1988	836	1	A,H,K,N		1				NO	
11/18/1988	837	2			1				NO	
11/19/1988	810	1	A,B,G,K		1				NO	INVOLUNTARY 3X5IN LE PIECE LIBERATED
11/19/1988	1041	1			1				NO	
11/20/1988	838	2			1				NO	
11/21/1988	1042	1			1				NO	
11/22/1988	709	2			1				NO	
11/23/1988	710	2			1				NO	
11/23/1988	711	2	A,B,C		1				NO	FOUND ON SHOP INSPEC. FOR OTHER REASON
11/23/1988	811	1	A,I		1				YES	TRVS FRAC, 75IN ABOVE MIDSPAN SHROUD
11/24/1988	712	1			1				NO	N1 ENG CORE INLET PARTIALLY BLOCKED
11/24/1988	1042	1	A,D		2				NO	
11/24/1988	1205	2	A,C		2				NO	CHANGED FAN DUE TO BENT BLDs # UNK
11/26/1988	812	1	A,D		2				NO	
11/27/1988	813	2	A,D		2				NO	FAN CHANGE, ING WHILE IN REVERSE THRUST
11/29/1988	839	1			2				NO	
11/30/1988	841	2	A,H,I,N		1	COMPRESSOR	HIGH	NONE	NO	FOUND ON GRD INSPEC
12/01/1988	713	2	A,C,H		1				NO	ONE F BLD TRVS FRAC, 100% LOSS OF THRUST
12/04/1988	714	1	A,D		2				NO	ACOUSTIC LINING AT REAR OF FBLDS MISSING
12/05/1988	815	1	A,D		2				NO	EPR SYMPTOM
12/05/1988	840	2	A,D		2				NO	4 F BLDs BENT
12/07/1988	715	2	A,C		2				NO	1 F BLD BENT AT TIP
12/07/1988	716	1			2				NO	
12/07/1988	717	2	A,H		2				NO	4 F BLDs MARKED DUE TO SHINGLING
12/11/1988	718	2	A,C		2				NO	FOUND ON GRD INSPEC.

SOURCE : ENGINE MANUFACTURER

EVT#	ENG	POS	BIRD_NAM	BIRD_SPE	#_BIRDS	WT_QZ	1	CTY_PRS	AIRPORT	LOCATE	US_INCID	ENGINE	DASH
12/11/1988	842	2	BROWN-HOODED GULL	14N35	*	10.1		BH1	BAHIA BLANCA ARGENTINA	NO	JT8D	9	
12/12/1988	843	2	DUCK*		32.	TJ		TOTORI, JAPAN	NO	JT8D	15A		
12/13/1988	816	2	COMMON OYSTERCATCHER	4N1	*	8.	-GO!	AKL	AUKLAND, NEW ZEALAND	NO	JT8D	17	
12/14/1988	1043	2						INDIA	ARGENTINA	NO	JT8D	9A	
12/14/1988	517	1							AMSTERDAM NETHERLANDS	NO	CFM56	3	
12/15/1988	719	2	HERRING GULL	14N14	1	40.	AMS-FCO AMS	KODIAK ALASKA	YES	JT8D	17A		
12/15/1988	818	2	HERRING GULL	14N14	2	40.	AMS-FCO ADQ	LONG ISLAND NY	YES	CFM56	3		
12/19/1988	720	2	PARTIDGE*		1	40.	ISP-PIT ISP	SALTA ARGENTINA	NO	JT8D	9A		
12/19/1988	819	1						BLOEMFONTEIN S. AFRICA	NO	JT8D	17A		
12/20/1988	820	2	GULL*				OIT	OUTA JAPAN	NO	JT8D	17A		
12/20/1988	844	2						BLOEMFONTEIN S. AFRICA	NO	JT8D	17A		
12/21/1988	821	1	KIEWIET*					BLOEMFONTEIN S. AFRICA	NO	JT8D	17A		
12/21/1988	821	2	KIEWIET*					BLOEMFONTEIN S. AFRICA	NO	JT8D	17A		
12/21/1988	822	2	WOOD PIGEON	2P9	1	18.	BFN-JNB BFN	BLOEMFONTEIN S. AFRICA	NO	JT8D	17A		
12/21/1988	822	2	RING-BILLED GULL	14N12	1	16.	ALB-PHL PHL	ALGERIA	NO	JT8D	17A		
12/22/1988	721	1	HORNED LARK	17274	1	5.	-HOU	PHILA PA	YES	CFM56	3		
12/23/1988	797	1	GULL*				LAX-SJC SJC	HOUSTON TX	YES	CFM56	3		
12/25/1988	722	2					SAT-DAL SAT	SAN JOSE CA	YES	CFM56	3		
12/25/1988	723	2	DOVE*				PEK-	SAN ANTONIO TX	YES	CFM56	3		
12/28/1988	824	2						CHINA	NO	JT8D	17A		
12/30/1988	725	1						PHOENIX AZ	YES	CFM56	3		
12/31/1988	726	1						DALLAS/FORT WORTH TX	YES	CFM56	3		
12/31/1988	827	1						SACRAMENTO CA	YES	CFM56	3		
01/03/1989	825	1						DALLAS/FORT WORTH TX	YES	CFM56	3		
01/03/1989	825	1						CAPE TOWN S. AFRICA	NO	CFM56	3		
01/06/1989	826	1						CANADA	NO	JT8D	15A		
01/11/1989	827	1						ARGENTINA	NO	JT8D	17A		
01/11/1989	863	2	STARLING*					BLOEMFONTEIN S. AFRICA	NO	CFM56	3		
01/11/1989	863	2	STARLING*					LAUNCESTON AUSTRALIA	NO	CFM56	3		
01/13/1989	864	1						LAUNCESTON AUSTRALIA	NO	CFM56	3		
01/16/1989	864	1						CHICAGO IL-MIDWAY	YES	CFM56	3		
01/19/1989	828	2	PIGEON*		2	14.	LAX-YVR LAX	LONDON GATWICK ENGLAND	YES	CFM56	3		
01/19/1989	829	2						LOS ANGELES CA	YES	CFM56	3		
01/19/1989	1203	1						HANA HAWAII	YES	CFM56	3		
01/20/1989	866	2						CORPUS CHRISTI TX	YES	CFM56	3		
01/22/1989	845	2						FRANKFURT GERMANY	NO	CFM56	3		
01/23/1989	1044	2						ALASKA	YES	CFM56	3		
01/23/1989	1045	1						JODHPUR INDIA	NO	JT8D	17A		
01/27/1989	846	1	KIEWIET*					INDIA	NO	JT8D	9A		
01/27/1989	867	2						KIMBERLEY S. AFRICA	NO	JT8D	9A		
01/27/1989	868	2						SAO PAULO BRAZIL	NO	CFM56	3		
01/29/1989	869	2						RIO DE JANEIRO BRAZIL	NO	CFM56	3		
01/29/1989	870	2						LOS ANGELES CA	YES	CFM56	3		
01/29/1989	1204	1						PALMA MALLORCA IS SPAIN	NO	CFM56	3		
01/30/1989	871	1						LIHUE KAUAI HAWAII	YES	CFM56	3		
02/05/1989	871	1						DUSSELDORF GERMANY	NO	CFM56	3		
02/05/1989	1046	1						MADRAS INDIA	NO	JT8D	9A		
02/06/1989	848	1						LIHUE KAUAI HAWAII	YES	JT8D	9A		
02/07/1989	850	2						WINDHOEK NAMIBIA	NO	JT8D	9A		
02/08/1989	872	2						LOS ANGELES CA	YES	CFM56	3		
02/08/1989	872	2						MYRTLE BEACH SC	NO	JT8D	15		
02/10/1989	1047	1						INDIA	NO	JT8D	17A		
02/11/1989	849	1						PORT ELIZABETH S. AFRICA	NO	JT8D	17A		
02/11/1989	1194	1						NORFOLK VA	YES	JT8D	17A		
02/12/1989	851	1	KIEWIET*					CA	YES	JT8D	7		
02/14/1989	873	2						FRANKFURT GERMANY	NO	CFM56	3		
02/15/1989	873	2	SMALLOW*					KIMBERLEY S. AFRICA	NO	JT8D	17A		
02/15/1989	874	1						GRAN CANARIA CANARY ISL	NO	CFM56	3		
02/16/1989	853	1						HALIFAX CANADA	NO	JT8D	9A		
02/20/1989	875	2						TENERIFE CANARY ISL	NO	CFM56	3		
02/20/1989	1193	2	SMALLOW*					LOS ANGELES CA	YES	CFM56	3		
02/21/1989	876	2	KIEWIET*					PHOENIX AZ	NO	CFM56	3		
02/22/1989	877	1	GULL*					CAPE TOWN S. AFRICA	NO	JT8D	17A		
02/24/1989	1191	2	GULL*					BELGRADE YUGOSLAVIA	NO	CFM56	3		
02/24/1989	1192	2	HAWK*					PHILA PA	YES	JT8D	15		
02/26/1989	855	1	KIEWIET*					NEW ORLEANS LA	YES	CFM56	3		
02/27/1989	878	1						BLOEMFONTEIN S. AFRICA	NO	JT8D	9		
								TENERIFE CANARY ISL	NO	CFM56	3		

SOURCE : ENGINE MANUFACTURER

EDATE	EV#	ENG	POS	ETIME	SIGN	EV#	AIRCRAFT	POF	ALTITUDE	SPEED	FL	RULES	L1	COND'S	WEATHER	CREW	AC	CREW AL	BIRD SEE
12/11/1988	842	2		9:20:00	MULT	ENG	200	CLIMB	50	125		CLEAR				NO	YES		
12/1/2/1988	843	2		18:15:00	MULT	BIRDS	200	LANDING	50			RAIN				NONE	NO	ONE	FLOCK
12/13/1988	816	2		10:22:00	MULT	BIRDS	200	TAKEOFF				CLEAR				NONE	NO	SEVERAL	
12/14/1988	1043	2			NONE		200	UNKNOWN				RAIN				ATB	NO	ONE	
12/15/1988	817	1		16:40:00	NONE		200	UNKNOWN				CLEAR				NONE	NO	NO	
12/18/1988	719	2		15:00:00	MULT	BIRDS	200	TAKEOFF	0	130	IFR	DARK				NONE	NO	ONE	FLOCK
12/19/1988	818	2		7:45:00	NONE		200	LANDING	70			RAIN				ATB	NO	SEVERAL	
12/20/1988	819	1		17:47:00	NONE		200	TAKEOFF	1500		VFR				NONE	NO	ONE		
12/20/1988	820	2		10:30:00	NONE		200	CLIMB	0	133					ATO	YES	NO		
12/21/1988	844	2		12:20:00	NONE		200	LANDING	100	130		CLEAR				NONE	NO	NO	
12/21/1988	821	1		7:00:00	MULT	ENG-BIRDS	200	LANDING	20	145		CLEAR				NONE	NO	FLOCK	
12/21/1988	821	2		7:00:00	MULT	ENG-BIRDS	200	TAKEOFF	20	145		CLEAR				NONE	NO	FLOCK	
12/22/1988	822	2			NONE		200	UNKNOWN				RAIN				NONE	NO	ONE	
12/22/1988	721	1		8:00:00	NONE		200	LANDING	0			CLEAR				ATB	NO	ONE	
12/23/1988	797	1			NONE		200	UNKNOWN				CLEAR				NONE	NO	NO	
12/25/1988	722	2		8:45:00	NONE		200	LANDING	0		VFR	BRIGHT				NO	NO	ONE	
12/25/1988	723	2			NONE		200	TAKEOFF	+V1			CLEAR				NONE	NO	FLOCK	
12/28/1988	823	2		17:36:00	NONE		200	UNKNOWN				OVERCAST				NONE	NO	NO	
12/30/1988	724	2			NONE		200	UNKNOWN				OVERCAST				ATB	NO	ONE	
12/31/1988	725	2		8:34:00	NONE		200	TAKEOFF	0	140	VFR				NONE	NO	NO		
01/03/1989	825	2			NONE		200	UNKNOWN				OVERCAST				ATB	NO	NO	
01/06/1989	826	2		12:45:00	MULT	ENG-BIRDS	200	TAKEOFF	3600	210	VFR				NONE	NO	NO		
01/08/1989	827	1		12:45:00	MULT	ENG-BIRDS	200	APPROACH	0		VFR				ATO	NO	NO		
01/11/1989	863	2		12:30:00	NONE		200	TAKEOFF	0	145		CLEAR				ATO	NO	NO	
01/13/1989	863	2			NONE		200	UNKNOWN				OVERCAST				ATO	NO	NO	
01/16/1989	864	2			NONE		200	LANDING				OVERCAST				ATO	NO	NO	
01/19/1989	828	2			NONE		200	TAKEOFF				OVERCAST				ATO	NO	NO	
01/19/1989	829	2			NONE		200	TAKEOFF	0	50	VFR				ATO	NO	NO		
01/20/1989	829	2		16:00:00	NONE		200	TAKEOFF	100	140	IFR	DAY			ATO	NO	NO		
01/22/1989	866	2			NONE		200	LANDING	0			FOG				NONE	NO	NO	
01/23/1989	845	2			NONE		200	UNKNOWN				CLEAR				ATO	NO	NO	
01/27/1989	1045	1		19:20:00	NONE		200	TAKEOFF	0			CLOUDY				ATO	NO	YES	
01/27/1989	846	1			NONE		200	UNKNOWN				NONE				ATO	NO	NO	
01/27/1989	867	2			NONE		200	LANDING	0			NONE				ATO	NO	NO	
01/29/1989	868	2			NONE		200	UNKNOWN				NONE				ATO	NO	NO	
01/29/1989	869	2			NONE		200	TAXI	0	0	VFR	DAY			ATO	NO	NO		
01/29/1989	870	2			NONE		200	TAKEOFF	0	130	VFR	DAY			ATO	NO	NO		
01/30/1989	871	2			NONE		200	LANDING	0			CLEAR				ATO	NO	NO	
02/05/1989	847	1			NONE		200	TAKEOFF	50			CLEAR				ATO	NO	NO	
02/06/1989	1046	1			NONE		200	TAKEOFF	0	70	VFR	DAY			PARTLY CLOUD	NONE	NO		
02/07/1989	848	1			NONE		200	TAKEOFF	0			CLEAR				ATO	NO	NO	
02/07/1989	850	2			NONE		200	TAKEOFF	0	145	VFR	DAY			CLOUD	NONE	NO		
02/08/1989	872	2		20:20:00	MULT	BIRDS	300	APPROACH				CLEAR				ATO	NO	NO	
02/10/1989	871	2			NONE		200	TAKEOFF				CLOUD				ATO	NO	NO	
02/15/1989	847	1			NONE		200	TAKEOFF				NONE				ATO	NO	NO	
02/11/1989	849	1			NONE		200	TAKEOFF				NONE				ATO	NO	NO	
02/12/1989	851	1			NONE		200	TAKEOFF				NONE				ATO	NO	NO	
02/14/1989	873	2			NONE		200	TAKEOFF				NONE				ATO	NO	NO	
02/15/1989	852	2			NONE		200	TAKEOFF				NONE				ATO	NO	NO	
02/16/1989	874	1			NONE		200	TAKEOFF				NONE				ATO	NO	NO	
02/20/1989	875	2			NONE		200	TAKEOFF				NONE				ATO	NO	NO	
02/20/1989	1193	1			NONE		200	TAKEOFF				NONE				ATO	NO	NO	
02/21/1989	876	2			NONE		200	TAKEOFF				NONE				ATO	NO	NO	
02/22/1989	854	2		10:44:00	MULT	BIRDS	300	TAKEOFF	5	140	VFR	DAY			CLEAR		NO		
02/24/1989	877	1		14:32:00	NONE		200	TAKEOFF	0	120	VFR				ATO	NO	NO		
02/24/1989	1191	2			NONE		200	TAKEOFF	3500	220	VFR	NIGHT			ABOVE CLOUDS	NONE	NO		
02/26/1989	1192	2			NONE		200	TAKEOFF	300	125	VFR				PARTLY CLOUD	NONE	YES		
02/26/1989	855	1		20:00:00	NONE		200	TAKEOFF	50	140					NONE	NO	NO		
02/27/1989	878	1																	

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG	POS	DMG_CODE	SEVERITY	POW LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
12/11/1988	842	2	A,C	3	NONE	NO	NO	NO	NO	NO
12/12/1988	843	2	A,C	3	NONE	NO	NO	NO	NO	NO
12/13/1988	846	2	A,C	3	NONE	NO	NO	NO	NO	NO
12/13/1988	1043	2	A,H	3	NONE	NO	NO	NO	NO	NO
12/14/1988	817	1	A,H	3	NONE	NO	NO	NO	NO	NO
12/15/1988	719	2	A,C	3	NONE	NO	NO	NO	NO	NO
12/18/1988	818	2	A,C	3	NONE	NO	NO	NO	NO	NO
12/19/1988	720	2	A,C,H	3	NONE	NO	NO	NO	NO	NO
12/20/1988	819	2	A,H	3	NONE	NO	NO	NO	NO	NO
12/21/1988	820	2	A,H	3	NONE	NO	NO	NO	NO	NO
12/21/1988	821	2	A,C	3	NONE	NO	NO	NO	NO	NO
12/22/1988	822	1	A,C	3	NONE	NO	NO	NO	NO	NO
12/23/1988	721	1	A,C	3	NONE	NO	NO	NO	NO	NO
12/25/1988	722	1	A,C	3	NONE	NO	NO	NO	NO	NO
12/25/1988	823	2	A,C	3	NONE	NO	NO	NO	NO	NO
12/28/1988	724	2	A,C,H	3	NONE	NO	NO	NO	NO	NO
12/30/1988	725	1	A,C,H	3	NONE	NO	NO	NO	NO	NO
12/31/1988	726	2	A,J	3	NONE	NO	NO	NO	NO	NO
12/31/1988	727	1	A	3	NONE	NO	NO	NO	NO	NO
01/03/1989	824	1	A,C,K	3	SLIGHT	NO	NO	NO	NO	NO
01/06/1989	825	2	A,C,K	3	NONE	NO	NO	NO	NO	NO
01/08/1989	826	1	A,C	3	YES	NO	NO	NO	NO	NO
01/11/1989	827	1	A,B,H	3	4.0	RETARD	NO	NO	NO	NO
01/13/1989	863	2	A,B,H	3	NONE	NO	NO	NO	NO	NO
01/16/1989	865	2	A,C,H	3	NONE	NO	NO	NO	NO	NO
01/19/1989	1203	1	A,C	3	NONE	NO	NO	NO	NO	NO
01/20/1989	845	2	A,C	3	NONE	NO	NO	NO	NO	NO
01/22/1989	1044	2	A,C	3	NONE	NO	NO	NO	NO	NO
01/23/1989	1045	1	A,H	3	NONE	NO	NO	NO	NO	NO
01/27/1989	846	1	A,H	3	NONE	NO	NO	NO	NO	NO
01/27/1989	867	2	A,H	3	NONE	NO	NO	NO	NO	NO
01/29/1989	868	2	A,H	3	NONE	NO	NO	NO	NO	NO
01/29/1989	869	2	A,D	3	NONE	NO	NO	NO	NO	NO
01/30/1989	1204	2	A,H	3	NONE	NO	NO	NO	NO	NO
02/05/1989	847	1	A,D	3	NONE	NO	NO	NO	NO	NO
02/06/1989	1046	1	A,C	3	NONE	NO	NO	NO	NO	NO
02/07/1989	848	1	A,C	3	NONE	NO	NO	NO	NO	NO
02/08/1989	850	2	A,H	3	NONE	NO	NO	NO	NO	NO
02/08/1989	1205	2	A,H	3	NONE	NO	NO	NO	NO	NO
02/10/1989	1047	2	A,H	3	NONE	NO	NO	NO	NO	NO
02/11/1989	849	1	A,H	3	NONE	NO	NO	NO	NO	NO
02/12/1989	1194	1	A	3	NONE	NO	NO	NO	NO	NO
02/14/1989	851	1	A,H	3	NONE	NO	NO	NO	NO	NO
02/15/1989	852	2	A,C	3	NONE	NO	NO	NO	NO	NO
02/16/1989	853	2	A,C	3	NONE	NO	NO	NO	NO	NO
02/17/1989	854	2	A,B	3	NONE	NO	NO	NO	NO	NO
02/22/1989	877	1	A,H	3	NONE	NO	NO	NO	NO	NO
02/24/1989	1191	2	A,H	3	NONE	NO	NO	NO	NO	NO
02/24/1989	1192	1	A,H	3	NONE	NO	NO	NO	NO	NO
02/26/1989	855	1	A,H	3	NONE	NO	NO	NO	NO	NO
02/27/1989	878	1	A,H	3	NONE	NO	NO	NO	NO	NO

SOURCE : ENGINE MANUFACTURER

E DATE	ENG#	ENG POS	ETIME	SIGN	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL	RULES	LT	COND'S	WEATHER	CREW	AC	CREW AL	BIRD SEE	
02/28/1989	1201	1	6:57:00	NONE	NONE	200	TAKEOFF	4	160	VFR	DAY	CLEAR	NONE	YES	FLOCK	YES	NO	NO	
03/02/1989	856	2		NONE	NONE	200	TAKEOFF	0	80	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NO	NO	
03/02/1989	879	1		NONE	NONE	300	UNKNOWN										NO	NO	
03/02/1989	1048	1		NONE	NONE	200	UNKNOWN										NO	NO	
03/03/1989	857	2		TRVS	FRAC	300	UNKNOWN										NO	NO	
03/03/1989	880	1		NONE	NONE	300	UNKNOWN										NO	NO	
03/03/1989	1202	1		NONE	NONE	300	LANDING	10	120	VFR	DAY	CLEAR	NONE	NO	ONE	NO	NO	NO	
03/05/1989	881	1		NONE	NONE	300	UNKNOWN										NO	NO	
03/05/1989	936	1		NONE	NONE	200	TAKEOFF									NO	NO	NO	
03/06/1989	1316	1		NONE	NONE	300	UNKNOWN									NO	NO	NO	
03/08/1989	937	1		NONE	NONE	200	TAKEOFF									NO	NO	NO	
03/09/1989	1049	1	6:40:00	NONE	NONE	200	UNKNOWN									NO	NO	NO	
03/10/1989	938	1		NONE	NONE	200	CLIMB	1000		I FR		CLEAR	NONE	NO	ATB	YES	YES	YES	
03/12/1989	858	1		NONE	NONE	200	TAKEOFF	0		NONE	NONE	NONE	NONE	NONE	NONE	NO	NO	NO	
03/14/1989	882	2		NONE	NONE	300	LANDING	0		NONE	NONE	NONE	NONE	NONE	NONE	NO	NO	NO	
03/15/1989	939	1		NONE	NONE	200	UNKNOWN									NO	NO	NO	
03/16/1989	940	2		NONE	NONE	200	UNKNOWN									NO	NO	NO	
03/18/1989	859	2		NONE	NONE	200	TAKEOFF	0	70	VFR	DAY	CLEAR	CLEAR	NO	ATB	ONE	ONE	ONE	
03/19/1989	861	1	17:10:00	MULT	BIRDS	200	TAKEOFF	0	70	VFR	NIGHT	PARTLY	CLOUD	NO	NO	NO	NO	NO	
03/20/1989	884	1		NONE	NONE	400	LANDING									NO	NO	NO	
03/23/1989	860	1		TRVS	FRAC	300	UNKNOWN									NO	NO	NO	
03/23/1989	941	1		NONE	NONE	200	UNKNOWN									NO	NO	NO	
03/24/1989	885	1		NONE	NONE	300	UNKNOWN									NO	NO	NO	
03/24/1989	886	1		NONE	NONE	300	UNKNOWN									NO	NO	NO	
03/28/1989	887	1		NONE	NONE	300	UNKNOWN									NO	NO	NO	
03/31/1989	888	1	8:00:00	NONE	NONE	300	TAKEOFF	0	10	BRIGHT				YES					
03/31/1989	942	2		NONE	NONE	300	LANDING	0	110			OVERCAST							
04/01/1989	889	1		NONE	NONE	300	UNKNOWN									NO	NO	NO	
04/01/1989	1050	1		NONE	NONE	200	UNKNOWN									NO	NO	NO	
04/02/1989	1101	1		NONE	NONE	200	LANDING	0		VFR	DAY	CLEAR	CLEAR	NO	SEVERAL	ONE	ONE	ONE	
04/02/1989	1190	2	9:15:00	NONE	NONE	300	UNKNOWN			VFR	DAY	CLEAR	CLEAR	NO	NO	NO	NO	NO	
04/03/1989	890	1		NONE	NONE	300	TAKEOFF	0								NO	NO	NO	
04/04/1989	891	1		NONE	NONE	300	TAKEOFF	0								NO	NO	NO	
04/07/1989	892	2		NONE	NONE	300	TAKEOFF	0								NO	NO	NO	
04/08/1989	893	1		NONE	NONE	300	UNKNOWN									NO	NO	NO	
04/08/1989	894	1		NONE	NONE	300	TAKEOFF	0								NO	NO	NO	
04/08/1989	895	1	20:40:00	NONE	NONE	300	APPROACH												
04/09/1989	896	1		NONE	NONE	300	UNKNOWN												
04/10/1989	862	2		NONE	NONE	400	TAKEOFF	0											
04/11/1989	897	1		NONE	NONE	300	LANDING	0											
04/13/1989	898	2		NONE	NONE	300	CLIMB												
04/14/1989	1181	1		NONE	NONE	300	UNKNOWN												
04/15/1989	899	2		NONE	NONE	300	TAKEOFF	0											
04/16/1989	900	2	16:00:00	MULT	BIRDS	300	TAKEOFF	0											
04/16/1989	943	2		NONE	NONE	300	UNKNOWN												
04/17/1989	944	2		NONE	NONE	300	TAKEOFF	0											
04/19/1989	901	1		NONE	NONE	300	UNKNOWN												
04/20/1989	946	1		NONE	NONE	200	TAKEOFF	0											
04/21/1989	947	2	20:00:00	NONE	NONE	200	LANDING	0											
04/21/1989	948	2	11:30:00	NONE	NONE	200	UNKNOWN												
04/22/1989	949	2		NONE	NONE	200	TAKEOFF	0											
04/23/1989	1022	1		NONE	NONE	200	UNKNOWN												
04/23/1989	950	1		NONE	NONE	200	TAKEOFF	0											
04/24/1989	951	1	15:45:00	NONE	NONE	200	UNKNOWN												
04/25/1989	902	2		NONE	NONE	300	TAKEOFF	0											
04/26/1989	903	2		NONE	NONE	300	TAKEOFF	0											
04/27/1989	952	2		NONE	NONE	300	TAKEOFF	0											
04/27/1989	953	2		NONE	NONE	300	TAKEOFF	0											
04/28/1989	904	2	9:45:00	MULT	BIRDS	300	TAKEOFF	0											
04/29/1989	905	2		NONE	NONE	300	UNKNOWN												
04/30/1989	906	1		NONE	NONE	300	TAKEOFF	0											
04/30/1989	907	1	19:31:00	NONE	NONE	300	TAKEOFF	0											
04/30/1989	944	1		NONE	NONE	200	CLIMB	2700	190	VFR	NIGHT	BELLOW CLOUDS	NO	NO	FLOCK	ONE	YES	NO	
04/30/1989	1200	1		NONE	NONE	200	TAKEOFF	0											
05/06/1989	1053	1		NONE	NONE	200	LANDING	0											
05/07/1989	908	1	18:00:00	MULT	BIRDS	200	TAKEOFF	0											
05/07/1989	945	1		NONE	NONE	150	TAKEOFF	0											

SOURCE : ENGINE MANUFACTURER

EDATE	EVT#	ENG	POS	BIRD_NAM	BIRD_SPE	# BIRDS	WT	OZ	1	CITY	PRS	AIRPORT	LOCALE	US	INCID	ENGINE	DASH
02/28/1989	1201	1		SPUR-WINGED PLOVER	SN24	1	12.			MSY		KENNER, LA	WELLINGTON, NEW ZEALAND	YES	JT8D	7B	
03/02/1989	856	2								WLG-AKL	WLG	YUGOSLAVIA	INDIA	NO	CFM56	3	
03/02/1989	879	1								TGD-BEG	-TRV			NO	JT8D	17	
03/02/1989	1048	1		MOURNING DOVE	2P105	1	4.			-PHX	MAF	PHOENIX, AZ	MIDLAND, TX	YES	CFM56	3	
03/03/1989	857	2								-DAL	LIT	DALLAS/FORT WORTH, TX	LITTLE ROCK, AR	YES	JT8D	15	
03/03/1989	880	1		MEADOW LARK*	18Z12	1	2.			HAM-MUC	HAM	HAMBURG, GERMANY	INDIA	NO	CFM56	3	
03/03/1989	1202	1		PURPLE MARTIN	14N29	1	7.6			HAR-VNS		HAMBURG, GERMANY	INDIA	NO	JT8D	15	
03/05/1989	881	1		GREY-HEADED GULL						HAM-MUC	HAM	XIAMEN, CHINA	INDIA	NO	JT8D	9A	
03/05/1989	936	1								HAM-MUC	HAM	LONDON-HEATHROW, ENGLAND	INDIA	NO	CFM56	3	
03/06/1989	1316	1								HAM-MUC	HAM	HOUSTON, TX	INDIA	YES	JT8D	9A	
03/08/1989	937	1								HAM-MUC	HAM	MI - IL	INDIA	NO	JT8D	15	
03/09/1989	1049	1		BLACK KITE	3K28	1	28.			HAM-MUC	HAM	UPTINGTON, S. AFRICA	INDIA	NO	JT8D	9A	
03/10/1989	938	1		STARLING*						HAM-MUC	HAM	LA GUARDIA, NY	INDIA	YES	CFM56	3	
03/12/1989	858	1		WHITE THROATED SPARROW	682218	1	1.			HAM-MUC	HAM	SAN JOSE, CA	INDIA	NO	JT8D	17A	
03/14/1989	882	2		SECRETARY*	9N4	1	1.			HAM-MUC	HAM	PORT HARCOURT, NIGERIA	INDIA	NO	JT8D	17A	
03/15/1989	939	2		SPOTTED THICK-KNEE						HAM-MUC	HAM	SEATTLE/TACOMA, WA	INDIA	YES	CFM56	3	
03/16/1989	940	2		GULL*						HAM-MUC	HAM	BELGRADE, YUGOSLAVIA	INDIA	NO	CFM56	3	
03/18/1989	859	2		COMMON ROCK DOVE	2P1	1	1.			HAM-MUC	HAM	PHOENIX, AZ	INDIA	YES	CFM56	3	
03/19/1989	861	1								HAM-MUC	HAM	CHEJU, KOREA	INDIA	NO	CFM56	3	
03/20/1989	884	1								HAM-MUC	HAM	MO - IL	INDIA	YES	JT8D	9A	
03/23/1989	860	1								HAM-MUC	HAM	EAST MIDLANDS, ENGLAND	INDIA	NO	CFM56	3	
03/24/1989	941	1								HAM-MUC	HAM	INDIA	INDIA	NO	JT8D	17	
03/24/1989	885	1								HAM-MUC	HAM	CHANDIGARH, INDIA	INDIA	NO	JT8D	15	
03/24/1989	886	1								HAM-MUC	HAM	WASHINGTON, DC	INDIA	YES	CFM56	3	
03/28/1989	887	1								HAM-MUC	HAM	DALLAS, TX	INDIA	YES	CFM56	3	
03/31/1989	888	1								HAM-MUC	HAM	KARACHI, PAKISTAN	INDIA	NO	CFM56	3	
04/01/1989	942	2								HAM-MUC	HAM	FUNCHAL, PORTUGAL	INDIA	NO	CFM56	3	
04/01/1989	889	2								HAM-MUC	HAM	DALLAS/FORT WORTH, TX	INDIA	YES	CFM56	3	
04/02/1989	1050	1								HAM-MUC	HAM	FRANKFURT, GERMANY	INDIA	NO	CFM56	3	
04/02/1989	1051	1								HAM-MUC	HAM	DUSSELDORF, GERMANY	INDIA	NO	CFM56	3	
04/02/1989	1199	2								HAM-MUC	HAM	ATHENS, GREECE	INDIA	NO	CFM56	3	
04/03/1989	890	1								HAM-MUC	HAM	LONDON-STANSTED, ENGLAND	INDIA	YES	CFM56	3	
04/04/1989	891	1								HAM-MUC	HAM	FRANKFURT, GERMANY	INDIA	NO	CFM56	3	
04/07/1989	892	2								HAM-MUC	HAM	AFRICA	INDIA	NO	CFM56	3	
04/08/1989	893	2								HAM-LHR	AMS	AMSTERDAM, NETHERLANDS	INDIA	NO	CFM56	3	
04/08/1989	894	1								HAM-LHR	AMS	AMSTERDAM	INDIA	NO	CFM56	3	
04/08/1989	895	1								YZ2-YUL		CANADA	INDIA	NO	JT8D	9A	
04/09/1989	896	2								SFO-LGB	SFO	MIDLAND/ODESSA, TX	SAN FRANCISCO, CA	YES	CFM56	3	
04/10/1989	862	2								DEL-DEL	DEL	DELHI, INDIA	EAST LONDON, S. AFRICA	NO	JT8D	17A	
04/11/1989	897	2								ELS-DUR	ELS	EAST LONDON, S. AFRICA	SALT LAKE CITY, UT	YES	JT8D	17	
04/12/1989	898	2								SJC-SLC	SLC	NEWARK, NJ	INDIA	NO	JT8D	15	
04/13/1989	899	2								BUR-CJB		INDIA	INDIA	NO	JT8D	9A	
04/14/1989	1181	2								2. DAL-		INDIANAPOLIS, INDIANA	SAUDI ARABIA	YES	JT8D	15	
04/15/1989	899	2								PHX		TX	TOINVILLE, AUSTRALIA	NO	CFM56	3	
04/16/1989	900	2								PHX		DALLAS, TX	INDIA	NO	CFM56	3	
04/16/1989	943	2								PHX		CEDAR RAPIDS, IA	INDIA	YES	CFM56	3	
04/19/1989	944	1								PHX		CHICAGO, IL	INDIA	YES	CFM56	3	
04/19/1989	901	1								PHX		NEWARK, NJ	INDIA	YES	CFM56	3	
04/19/1989	946	1								PHX		PHOENIX, AZ	INDIA	YES	CFM56	3	
04/20/1989	947	2								PHX		BELGRADE, YUGOSLAVIA	INDIA	NO	CFM56	3	
04/21/1989	948	2								PHX		AMSTERDAM	INDIA	NO	CFM56	3	
04/21/1989	1052	1								PHX		SAVANNAH, GA	INDIA	YES	JT8D	7B	
04/23/1989	951	1								PHX		ATLANTA, GA	INDIA	YES	JT8D	17	
04/25/1989	905	1								PHX		DELHI, INDIA	INDIA	NO	JT8D	9A	
04/26/1989	902	2								PHX		CHENGDU, CHINA	INDIA	NO	CFM56	3	
04/27/1989	952	2								PHX		MANAGUA, NICARAGUA	INDIA	NO	CFM56	3	
04/27/1989	953	2								PHX		CTU	INDIA	NO	JT8D	9A	
04/28/1989	904	2								PHX		PHOENIX, AZ	INDIA	NO	CFM56	3	
04/29/1989	905	1								PHX		ATLANTA, GA	INDIA	NO	CFM56	3	
04/30/1989	906	2								PHX		DELHI, INDIA	INDIA	NO	JT8D	9A	
04/30/1989	954	2								PHX		NEW YORK, NY	INDIA	NO	CFM56	3	
05/01/1989	1200	1								PHX		MANAGUA, NICARAGUA	INDIA	NO	JT8D	9A	
05/07/1989	908	1								PHX		PHOENIX, AZ	INDIA	NO	CFM56	3	
05/07/1989	955	1								PHX		ATLANTA, GA	INDIA	NO	CFM56	3	
SWAINSON'S HAWK	3K171	2								PHX		MANAGUA, NICARAGUA	INDIA	NO	CFM56	3	

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG	POS	DNG	CODE	SEVERITY	PWV	LOSS	MAX VIBE	THROTTLE	IF SD	REMARKS
02/28/1989	1201	1		A,C,K		9	HIGH					PM EVENT
03/02/1989	856	2		A,B		9	NONE	NONE	NO	NO	NO	DOOR FOUND ON GRD INSP
03/02/1989	879	1				9	NONE	NONE	NO	NO	NO	DOOR FOUND ON GRD INSP
03/02/1989	1048					9	NONE	NONE	NO	NO	NO	DOOR FOUND ON GRD INSP
03/03/1989	857	2		A,I		9	NONE	NONE	NO	NO	NO	DOOR, PM EVENT
03/03/1989	880	1				9	NONE	NONE	NO	NO	NO	DOOR, PM INSP
03/03/1989	1202					9	NONE	NONE	NO	NO	NO	DOOR, PM EVENT
03/05/1989	881					9	NONE	NONE	NO	NO	NO	DOOR
03/06/1989	936					9	NONE	NONE	NO	NO	NO	
03/08/1989	1316					9	NONE	NONE	NO	NO	NO	
03/09/1989	937					9	NONE	NONE	NO	NO	NO	
03/10/1989	1049					9	NONE	NONE	NO	NO	NO	
03/10/1989	938					9	NONE	NONE	NO	NO	NO	
03/12/1989	858	1		A,G		9	HIGH		NO	NO	NO	3 F BLD BROKEN, 1 LARGE BIRD
03/14/1989	882	2		A,D,G		9	NONE	NONE	NO	NO	NO	
03/15/1989	939	1				9	NONE	NONE	NO	NO	NO	
03/16/1989	940	2				9	NONE	NONE	NO	NO	NO	
03/18/1989	859	2		A,B,C		9	NONE	NONE	NO	NO	NO	
03/19/1989	881	1		A,C,H		9	NONE	NONE	NO	NO	NO	
03/20/1989	883					9	NONE	NONE	NO	NO	NO	
03/23/1989	860					9	NONE	NONE	NO	NO	NO	
03/24/1989	884	1		A,I		9	NONE	NONE	NO	NO	NO	
03/24/1989	885	1		A,C		9	NONE	NONE	NO	NO	NO	
03/28/1989	886	1				9	NONE	NONE	NO	NO	NO	
03/31/1989	887	1				9	NONE	NONE	NO	NO	NO	
03/31/1989	888	2				9	NONE	NONE	NO	NO	NO	
04/01/1989	889	2				9	NONE	NONE	NO	NO	NO	
04/01/1989	1050					9	NONE	NONE	NO	NO	NO	
04/02/1989	1051					9	NONE	NONE	NO	NO	NO	
04/02/1989	1109					9	NONE	NONE	NO	NO	NO	
04/03/1989	890					9	NONE	NONE	NO	NO	NO	
04/04/1989	891					9	NONE	NONE	NO	NO	NO	
04/07/1989	892					9	NONE	NONE	NO	NO	NO	
04/08/1989	893					9	NONE	NONE	NO	NO	NO	
04/08/1989	894					9	NONE	NONE	NO	NO	NO	
04/09/1989	895					9	NONE	NONE	NO	NO	NO	
04/10/1989	896					9	NONE	NONE	NO	NO	NO	
04/11/1989	897					9	NONE	NONE	NO	NO	NO	
04/13/1989	898					9	NONE	NONE	NO	NO	NO	
04/14/1989	1181					9	NONE	NONE	NO	NO	NO	
04/15/1989	899					9	NONE	NONE	NO	NO	NO	
04/16/1989	900					9	NONE	NONE	NO	NO	NO	
04/16/1989	943					9	NONE	NONE	NO	NO	NO	
04/19/1989	901					9	NONE	NONE	NO	NO	NO	
04/19/1989	944					9	NONE	NONE	NO	NO	NO	
04/19/1989	945					9	NONE	NONE	NO	NO	NO	
04/21/1989	946					9	NONE	NONE	NO	NO	NO	
04/21/1989	947					9	NONE	NONE	NO	NO	NO	
04/21/1989	948					9	NONE	NONE	NO	NO	NO	
04/23/1989	950					9	NONE	NONE	NO	NO	NO	
04/25/1989	951					9	NONE	NONE	NO	NO	NO	
04/26/1989	903					9	NONE	NONE	NO	NO	NO	
04/27/1989	952					9	NONE	NONE	NO	NO	NO	
04/28/1989	953					9	NONE	NONE	NO	NO	NO	
04/28/1989	904					9	NONE	NONE	NO	NO	NO	
04/29/1989	905					9	NONE	NONE	NO	NO	NO	
04/30/1989	906					9	NONE	NONE	NO	NO	NO	
04/30/1989	1200					9	NONE	NONE	NO	NO	NO	
05/06/1989	1053					9	NONE	NONE	NO	NO	NO	
05/07/1989	908					9	NONE	NONE	NO	NO	NO	
05/07/1989	955					9	NONE	NONE	NO	NO	NO	

SOURCE : ENGINE MANUFACTURER

EVT#	ENG_POS	ETIME	SIGN_EVT	AIRCRAFT_POF	AL	AC	CREW	BIRD SEE
05/08/1989	909	909 1	NONE	400 APPROACH	250		NONE	NO
05/08/1989	910	910 1	NONE	300 LANDING	0		NONE	NO
05/08/1989	956	956 2	NONE	300 UNKNOWN			NONE	NO
05/10/1989	911	911 1	NONE	300 UNKNOWN			NONE	NO
05/12/1989	912	912 1	NONE	300 UNKNOWN			ATO	NO
05/14/1989	913	913 1	NONE	300 TAKEOFF	0 60	BRIGHT	CLEAR	SEVERAL YES
05/16/1989	957	957 1	NONE	200 LANDING	0		NONE	NO
05/17/1989	1054	1054 2	NONE	200 UNKNOWN			ATO	NO
05/18/1989	914	914 1	NONE	300 TAKEOFF			ATO	NO
05/20/1989	915	915 1	NONE	300 UNKNOWN			ATO	NO
05/20/1989	958	958 1	NONE	200 UNKNOWN			ATO	NO
05/22/1989	1055	1055 2	NONE	200 UNKNOWN			ATO	NO
05/25/1989	959	959 1	19:45:00	400 CLIMB	4000 120	VFR	DAY	CLEAR
05/25/1989	960	960 1	NONE	200 TAKEOFF	100 150			ONE
05/26/1989	917	917 2	NONE	300 UNKNOWN			YES	NO
05/27/1989	918	918 2	NONE	400 APPROACH	0 139	DUSK	CLEAR	FLOCK
05/31/1989	919	919 1	MULT ENG	400 TAKEOFF	0 139	DUSK	CLEAR	FLOCK
06/01/1989	1056	1056 2	NONE	400 UNKNOWN			ATO	NO
06/02/1989	920	920 1	NONE	400 CLIMB	30000 240	VFR	NIGHT	CLEAR
06/02/1989	921	921 2	NONE	300 UNKNOWN			ATO	NO
06/03/1989	922	922 1	NONE	300 APPROACH	0		NONE	NO
06/04/1989	1196	1196 1	NONE	300 LANDING	0 115	VFR	DAY	OVERCAST
06/05/1989	924	924 1	12:26:00	300 UNKNOWN	0		NONE	NO
06/07/1989	925	925 2	12:30:00	300 TAKEOFF	0 135	LIGHT	RAIN	ONE
06/08/1989	926	926 2	NONE	400 UNKNOWN	0		NONE	NO
06/10/1989	927	927 1	NONE	300 UNKNOWN			ATO	NO
06/12/1989	961	961 1	16:48:00	300 UNKNOWN			ATO	NO
06/13/1989	962	962 1	21:05:00	200 CRUISE	0 90	IFR	DAY	OVERCAST
06/13/1989	1057	1057 1	NONE	200 TAKEOFF	50 145			NO
06/15/1989	1058	1058 1	NONE	200 UNKNOWN			ATO	NO
06/16/1989	928	928 1	NONE	300 UNKNOWN			ATO	NO
06/19/1989	929	929 2	MULT BIRDS	300 UNKNOWN	0		ATO	NO
06/19/1989	930	930 2	NONE	300 TAKEOFF	0 137			FLOCK
06/20/1989	963	963 1	NONE	200 UNKNOWN			ATO	NO
06/20/1989	904	904 2	NONE	200 UNKNOWN			ATO	NO
06/21/1989	1059	1059 1	NONE	300 UNKNOWN			ATO	NO
06/21/1989	931	931 1	18:10:00	400 UNKNOWN	0 110	V2	VFR	NO
06/22/1989	965	965 1	17:55:00	300 UNKNOWN	0			NO
06/22/1989	1195	1195 2	NONE	400 TAKEOFF	0 110	V2	VFR	NO
06/23/1989	932	932 2	NONE	300 CLIMB	0			NO
06/24/1989	933	933 1	NONE	300 LANDING	0			NO
06/24/1989	966	966 2	5:50:00	200 UNKNOWN	0 135			NO
06/25/1989	934	934 2	NONE	300 TAKEOFF	.VI			NO
06/26/1989	935	935 1	NONE	300 CLIMB	6000			NO
06/28/1989	967	967 2	8:30:00	200 UNKNOWN	0 110			NO
07/03/1989	1060	1060 2	NONE	200 TAKEOFF	0			NO
07/04/1989	1115	1115 1	NONE	300 LANDING	0			NO
07/06/1989	969	969 2	NONE	300 CLIMB				NO
07/07/1989	1116	1116 2	NONE	300 TAKEOFF				NO
07/07/1989	970	970 2	NONE	300 UNKNOWN				NO
07/08/1989	1117	1117 2	NONE	300 UNKNOWN				NO
07/10/1989	971	971 1	NONE	300 UNKNOWN				NO
07/10/1989	1118	1118 2	NONE	300 UNKNOWN				NO
07/11/1989	972	972 2	NONE	300 UNKNOWN				NO
07/11/1989	1119	1119 1	NONE	300 UNKNOWN				NO
07/12/1989	973	973 2	NONE	300 APPROACH	0			NO
07/12/1989	974	974 2	NONE	200 LANDING	0			NO
07/13/1989	975	975 2	NONE	200 UNKNOWN	0			NO
07/13/1989	976	976 2	NONE	200 TAKEOFF	0			NO
07/15/1989	977	977 2	NONE	200 LANDING	0			NO
07/16/1989	1180	1180 1	NONE	200 UNKNOWN				NO
07/17/1989	979	979 2	NONE	200 UNKNOWN				NO

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG	POS	BIRD_NAM	BIRD_SPE	#_BIRDS	WT	OZ	1	CITY	PRS	AIRPORT	LOCATE	US	INCID	ENGINE	DASH
05/08/1989	909	1		RING-NECKED PHEASANT	4L161	1	44.	-	BRU				BRUSSELS, BELGIUM	NO	CFM56	3	
05/08/1989	910	1								DETROIT, MI			DET	YES	CFM56	3	
05/08/1989	956	2								CANADA			-YHZ	NO	JT8D	9A	
05/10/1989	911	1		SORA	7H84	1	3.	SUX-PHX		ARIZONA				YES	CFM56	3	
05/12/1989	912	1		ROCK DOVE*						LONDON-GATWICK			ENGLAND	NO	CFM56	3	
05/14/1989	913	1		GULL*						AJACCIO, FRANCE				NO	CFM56	3	
05/16/1989	957	2								ROME DA VINCI, ITALY				NO	CFM56	3	
05/17/1989	1054	2								INDIA				NO	JT8D	15A	
05/18/1989	914	1		ROCK DOVE*						TENERIFE, CANARY ISLANDS				NO	CFM56	3	
05/20/1989	915	1								FRANKFURT, GERMANY				NO	CFM56	3	
05/20/1989	1053	2		SWIFT	1055	1	2.	IST-LHR		TURKEY - ENGLAND				NO	JT8D	15A	
05/25/1989	1055	2								INDIA				NO	CFM56	3	
05/25/1989	916	1		KESTREL	SK27	1	8.	EAM-JED EAM		REYKAVIK, ICELAND				NO	CFM56	3	
05/25/1989	959	1		ROCK DOVE	2P1	1	14.	IHX-UDR		NEJMAN, SAUDI ARABIA				NO	JT8D	15	
05/26/1989	960	1								DALLAS/FORT WORTH, TX				YES	CFM56	3	
05/27/1989	917	2								HOUSTON, TX				YES	CFM56	3	
05/31/1989	918	2		BLACK-HEADED GULL	14N36	1	9.	IST-HR		ALICANTE, SPAIN				NO	CFM56	3	
05/31/1989	919	1		BLACK-HEADED GULL	14N36	1	9.7	VNC		VENICE, ITALY				NO	CFM56	3	
05/31/1989	919	2								INDIA				NO	CFM56	3	
06/01/1989	1056	2								TAMPA, FL				NO	CFM56	3	
06/01/1989	1197	1								FRANKFURT, GERMANY				YES	CFM56	3	
06/02/1989	920	1								SYDNEY, AUSTRALIA				NO	CFM56	3	
06/02/1989	921	2								COPENHAGEN, DENMARK				NO	CFM56	3	
06/03/1989	923	1		BLACK-HEADED GULL	14N36	1	9.7	CPH-ARN		SALT LAKE CITY, UT				YES	CFM56	3	
06/04/1989	1196	1		GULL*						LONDON, HEATHROW, ENGLAND				NO	CFM56	3	
06/05/1989	924	1		ROCK DOVE*						EDINBURGH, SCOTLAND				NO	CFM56	3	
06/08/1989	925	2								SEOUL, S. KOREA				NO	CFM56	3	
06/10/1989	926	2								HOUSTON, TX				YES	CFM56	3	
06/12/1989	927	1		CROWNED LAPWING	SN11	1	10.	PLZ-ELZ		PORT ELIZABETH, S. AFRICA				NO	JT8D	17A	
06/13/1989	961	1		POMARINE JAEGER	13N4	1	11.	PLZ-FAL		PEDRO BAY, ALASKA				YES	CFM56	3	
06/13/1989	962	1								INDIA				NO	JT8D	17A	
06/13/1989	1057	1								INDIA - DENMARK				NO	CFM56	3	
06/15/1989	1058	1								HANOVER, GERMANY				NO	CFM56	3	
06/16/1989	929	2								PULA, YUGOSLAVIA				YES	CFM56	3	
06/15/1989	1058	1								HOUSTON, TX				NO	JT8D	17A	
06/16/1989	929	2		GULL*						JEDDAH, SAUDI ARABIA				NO	CFM56	3	
06/19/1989	930	2								INDIA				NO	CFM56	3	
06/19/1989	963	1								SYDNEY, AUSTRALIA				NO	CFM56	3	
06/20/1989	964	2								MAHON, MENORCA, SPAIN				NO	CFM56	3	
06/20/1989	1059	1								DAYTONA BEACH, FL				YES	CFM56	3	
06/20/1989	1059	2								IBIZA, SPAIN				NO	CFM56	3	
06/21/1989	931	1								LARNACA, CYPRUS				NO	CFM56	3	
06/21/1989	965	1		GULL*						TARBES, FRANCE				NO	CFM56	3	
06/22/1989	965	1								STAVANGER, NORWAY				NO	CFM56	3	
06/22/1989	1195	2								LONDON-GATWICK, ENGLAND				NO	CFM56	3	
06/23/1989	932	2		HERRING GULL	14N14	1	35.9	IBZ-PHI		BLOEMFONTEIN, S. AFRICA				NO	JT8D	9A	
06/24/1989	933	1								DAYTONA BEACH, FL				YES	CFM56	3	
06/24/1989	966	1		BLACK KITE	3K28	1	12.	LDE		IBIZA, SPAIN				NO	CFM56	3	
06/25/1989	934	2								LARNACA, CYPRUS				NO	CFM56	3	
06/25/1989	935	1		GULL*						TARBES, FRANCE				NO	CFM56	3	
06/26/1989	935	2								STAVANGER, NORWAY				NO	CFM56	3	
06/26/1989	967	2								LONDON-GATWICK, ENGLAND				NO	CFM56	3	
06/28/1989	968	1								BLOEMFONTEIN, S. AFRICA				YES	CFM56	3	
06/28/1989	968	2								DAYTONA BEACH, FL				NO	CFM56	3	
07/03/1989	1060	2								IBIZA, SPAIN				NO	CFM56	3	
07/04/1989	1115	2								LARNACA, CYPRUS				NO	CFM56	3	
07/06/1989	969	2								TARBES, FRANCE				NO	CFM56	3	
07/07/1989	1116	2								STAVANGER, NORWAY				NO	CFM56	3	
07/08/1989	970	2								LONDON-GATWICK, ENGLAND				NO	CFM56	3	
07/09/1989	1117	2								BLOEMFONTEIN, S. AFRICA				NO	CFM56	3	
07/10/1989	971	2								DAYTONA BEACH, FL				YES	CFM56	3	
07/10/1989	1118	2								IBIZA, SPAIN				NO	CFM56	3	
07/11/1989	972	2								LARNACA, CYPRUS				NO	CFM56	3	
07/11/1989	1119	2								TARBES, FRANCE				NO	CFM56	3	
07/12/1989	973	2								STAVANGER, NORWAY				NO	CFM56	3	
07/13/1989	974	2								LONDON-GATWICK, ENGLAND				NO	CFM56	3	
07/14/1989	975	2								BLOEMFONTEIN, S. AFRICA				NO	CFM56	3	
07/15/1989	976	2								DAYTONA BEACH, FL				NO	CFM56	3	
07/15/1989	977	2								IBIZA, SPAIN				NO	CFM56	3	
07/16/1989	978	2								LARNACA, CYPRUS				NO	CFM56	3	
07/17/1989	1180	2								TARBES, FRANCE				NO	CFM56	3	
07/17/1989	979	2								STAVANGER, NORWAY				NO	CFM56	3	
07/18/1989	1180	2								LONDON-GATWICK, ENGLAND				NO	CFM56	3	
07/19/1989	979	2								BLOEMFONTEIN, S. AFRICA				NO	CFM56	3	
07/20/1989	1181	2								DAYTONA BEACH, FL				NO	CFM56	3	
07/21/1989	980	2								IBIZA, SPAIN				NO	CFM56	3	
07/22/1989	981	2								LARNACA, CYPRUS				NO	CFM56	3	
07/23/1989	982	2								TARBES, FRANCE				NO	CFM56	3	
07/24/1989	983	2								STAVANGER, NORWAY				NO	CFM56	3	
07/25/1989	984	2								LONDON-GATWICK, ENGLAND				NO	CFM56	3	
07/26/1989	985	2								BLOEMFONTEIN, S. AFRICA				NO	CFM56	3	
07/27/1989	986	2								DAYTONA BEACH, FL				NO	CFM56	3	
07/28/1989	987	2								IBIZA, SPAIN				NO	CFM56	3	
07/29/1989	988	2								LARNACA, CYPRUS				NO	CFM56	3	
07/30/1989	989	2								TARBES, FRANCE				NO	CFM56	3	
07/31/1989	990	2								STAVANGER, NORWAY				NO	CFM56	3	
08/01/1989	991	2								LONDON-GATWICK, ENGLAND				NO	CFM56	3	
08/02/1989	992	2								BLOEMFONTEIN, S. AFRICA				NO	CFM56	3	
08/03/1989	993	2								DAYTONA BEACH, FL				NO	CFM56	3	
08/04/1989	994	2								IBIZA, SPAIN				NO	CFM56	3	
08/05/1989	995	2								LARNACA, CYPRUS				NO	CFM56	3	
08/06/1989	996	2								TARBES, FRANCE				NO	CFM56	3	
08/07/1989	997	2								STAVANGER, NORWAY				NO	CFM56	3	
08/08/1989	998	2								LONDON-GATWICK, ENGLAND				NO	CFM56	3	
08/09/1989	999	2								BLOEMFONTEIN, S. AFRICA				NO	CFM56	3	
08/1																	

SOURCE : ENGINE MANUFACTURER

EDATE	EVT#	ENG	POS	DMG_CODE	SEVERITY	POW LOSS	MAX VIBE	THROTTLE	IFSD	REMARKS
05/08/1989	Y09	1		A,E	9	NONE				NO
05/08/1989	910	1		A,C	3	NONE				NO
05/08/1989	956	2		A,H	9	NONE				NO
05/08/1989	911	2		A,C,H	9	NONE				NO
05/12/1989	912	1		A,H	3	NONE				NO
05/14/1989	913	1		A,D,G,H	3	NONE				NO
05/16/1989	957	1		A,C	3	NONE				NO
05/18/1989	1054	2		A	4	NONE				NO
05/20/1989	914	1			4	NONE				NO
05/20/1989	915	1			4	NONE				NO
05/20/1989	1055	2			4	NONE				NO
05/25/1989	1059	1			4	NONE				NO
05/25/1989	959	1		A,C	3	YES				NO
05/26/1989	960	1		A,C	3	NONE				NO
05/27/1989	917	2		A,H	9	NONE				NO
05/31/1989	918	2		A,C,H	9	NONE				NO
05/31/1989	919	2		A,D,H	9	NONE				NO
06/01/1989	1056	2		A,D,G,H	3	NONE				NO
06/02/1989	1197	1		A,H	3	NONE				NO
06/02/1989	920	1		A,H	3	NONE				NO
06/02/1989	921	2		A,H	3	NONE				NO
06/03/1989	922	1		A,H	3	NONE				NO
06/03/1989	923	1		A,H	3	NONE				NO
06/04/1989	1196	1		A,C,H	3	NONE				NO
06/05/1989	924	1		A,C,H	3	NONE				NO
06/07/1989	925	2		A,C,H	3	NONE				NO
06/08/1989	926	2		A,C,H	3	NONE				NO
06/10/1989	927	1		A,C,H	3	NONE				NO
06/12/1989	961	1		A,C	3	NONE				NO
06/13/1989	962	1		A,D,I,K	3	NONE				NO
06/13/1989	1057	1		A,D,I,K	3	NONE				NO
06/15/1989	1058	1		A,D,H	3	NONE				NO
06/16/1989	928	2		A,B	3	NONE				NO
06/19/1989	929	2		A,D,G,H	3	NONE				NO
06/19/1989	930	2		A,H	3	NONE				NO
06/20/1989	963	2		A,H	3	NONE				NO
06/20/1989	1059	1		A,H	3	NONE				NO
06/21/1989	931	1		A	4	NONE				NO
06/22/1989	965	1		A	4	NONE				NO
06/22/1989	1195	1		A	4	NONE				NO
06/23/1989	932	2		A,B	3	NONE				NO
06/24/1989	933	2		A,I,M,P	3	NONE				NO
06/24/1989	966	1		A,C,H	3	NONE				NO
06/25/1989	934	2		A,B,H	3	NONE				NO
06/26/1989	935	1		A,B,H	3	NONE				NO
06/28/1989	967	2		A,B,H	3	NONE				NO
06/28/1989	968	2		A,B,H	3	NONE				NO
07/03/1989	1060	2		A,C	3	NONE				NO
07/04/1989	969	2		A,C	3	NONE				NO
07/06/1989	1115	2		A,I,K	3	NONE				NO
07/07/1989	1116	2		A,C	3	NONE				NO
07/08/1989	970	2		A,C	3	NONE				NO
07/09/1989	1117	2		A,I,K	3	NONE				NO
07/10/1989	971	2		A,C	3	NONE				NO
07/11/1989	1118	2		A,C	3	NONE				NO
07/11/1989	972	2		A,H	3	NONE				NO
07/11/1989	1119	1		A,G	3	NONE				NO
07/12/1989	973	2		A,G	3	NONE				NO
07/12/1989	974	1		A,G	3	NONE				NO
07/12/1989	975	2		A,D,K	3	NONE				NO
07/13/1989	976	2		A,D,K	3	NONE				NO
07/15/1989	977	2		A,C,G,I	3	NONE				NO
07/16/1989	1180	1		A,H	3	NONE				NO
07/17/1989	979	2								NO

SOURCE : ENGINE MANUFACTURER

EDATE	ENG#	POS	ETIME	SIGN	EVT	AIRCRAFT POF	ALTITUDE	SPEED	FL	RULES	L1	CODNS	WEATHER	CREW AC	CREW AL	BIRD SEE
07/17/1989	980	2	21:35:00	TRVS	FRAC	UNKNOWN TAKEOFF UNKNOWN	200	137						NONE	NO	
07/18/1989	995	2				UNKNOWN TAKEOFF UNKNOWN	400							ATO		
07/18/1989	1120	2	18:00:00	TRVS		UNKNOWN TAKEOFF UNKNOWN	300	0	VFR					NONE		
07/18/1989	1121	1				LANDING UNKNOWN	400							DIV		
07/20/1989	981	2		MULT	BIRDS	LANDING UNKNOWN	200							NONE		
07/21/1989	1123	1		NONE		LANDING UNKNOWN	300							NONE		
07/24/1989	1124	1		NONE		LANDING UNKNOWN	300							NONE		
07/25/1989	982	1	14:30:00	NONE		LANDING UNKNOWN	300							NONE		
07/26/1989	983	2		NONE		LANDING UNKNOWN	300							NONE		
07/27/1989	1126	2		NONE		LANDING 0	300							NONE		
07/27/1989	1127	1	12:00:00	NONE		APPROACH UNKNOWN	300							NONE		
07/28/1989	984	2	18:00:00	TRVS	FRAC	TAKEOFF CRUISE UNKNOWN	200	20						ATB		
07/28/1989	1128	2		NONE		TAKEOFF CRUISE UNKNOWN	300							NONE		
07/28/1989	1129	2	8:17:00	NONE		LANDING 0	400							NONE		
07/29/1989	1130	1		NONE		LANDING 0	400							NONE		
07/29/1989	1130	1		NONE		LANDING 0	400							NONE		
07/30/1989	986	1		NONE		LANDING 0	400							NONE		
07/30/1989	1131	1		NONE		APPROACH UNKNOWN	300							NONE		
07/30/1989	1132	1		NONE		APPROACH UNKNOWN	300							NONE		
07/31/1989	1133	1		NONE		CLIMB UNKNOWN	300							NONE		
08/01/1989	1134	2		NONE		CLIMB UNKNOWN	400							NONE		
08/01/1989	1135	1		NONE		CLIMB UNKNOWN	400							NONE		
08/02/1989	1136	1		NONE		TAKEOFF CLIMB UNKNOWN	300							NONE		
08/02/1989	1136	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/02/1989	1198	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/02/1989	1206	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/03/1989	987	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/03/1989	1137	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/04/1989	988	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/04/1989	1138	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/10/1989	990	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/10/1989	1139	2	11:00:00	NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/10/1989	1140	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/11/1989	1141	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/11/1989	1142	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/12/1989	1143	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/13/1989	991	1		NONE		TAKEOFF CLIMB UNKNOWN	200							ATO		
08/13/1989	1144	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/14/1989	1145	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/14/1989	1145	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/15/1989	1146	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/15/1989	1146	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/15/1989	1147	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/18/1989	1148	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/18/1989	1149	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/19/1989	1150	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/19/1989	1151	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/20/1989	993	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/25/1989	994	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/26/1989	995	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/27/1989	997	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/28/1989	1152	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/29/1989	1153	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/29/1989	1154	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/29/1989	1155	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/30/1989	998	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
08/31/1989	1156	1		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
09/01/1989	1157	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
09/03/1989	1159	2		NONE		TAKEOFF CLIMB UNKNOWN	200							ATB		
09/04/1989	1160	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		
09/05/1989	999	2	17:30:00	MULT	ENG	TAKEOFF CLIMB UNKNOWN	200							DIV		
09/05/1989	999	2	17:30:00	MULT	ENG	TAKEOFF CLIMB UNKNOWN	200							DIV		
09/06/1989	1000	2		NONE		TAKEOFF CLIMB UNKNOWN	200							ATB		
09/06/1989	1001	2		NONE		TAKEOFF CLIMB UNKNOWN	200							NONE		

SOURCE : ENGINE MANUFACTURER

EDATE	EVT#	ENG	POS	BIRD_NAM	BIRD_SPE	#_BIRDS	WT_OZ_1	CITY_PRS	AIRPORT	LOCATE	US_INCID	ENGINE_DASH
07/17/1989	930	2		WESTERN MEADOWLARK	64268	4.		LKS-ATH LXS		LEMNOS, GREECE	YES	JT8D 9A
07/18/1989	995	2		GULL*		1		-PUS		PUSAN, KOREA	NO	JT8D 9A
07/18/1989	1120	1						BOH-FAO BOH		BOURGOUTH, ENGLAND	NO	CFM56
07/18/1989	1121	1						DUSSELDORF, GERMANY		DUSSELDORF, GERMANY	NO	CFM56
07/18/1989	1122	1		SANDPIPER*		1		YEG-YVR YVR		VANCOUVER, CANADA	NO	CFM56
07/21/1989	981	2				*		-IND		INDIANAPOLIS, IN	YES	CFM56
07/24/1989	1123	1		COMMON EGRET		1		DC - FL		DALLAS, TX	YES	CFM56
07/25/1989	982	1						IAD-PA YXS-YVR YXS		PRINCE GEORGE, CANADA	NO	JT8D 9A
07/26/1989	983	2						-DAL		DALLAS, TX	YES	CFM56
07/26/1989	1125	1						LGG		LIEGE, BELGIUM	NO	CFM56
07/27/1989	1126	2						ZAKINTHOS, GREECE		SAUDI ARABIA	NO	CFM56
07/27/1989	1127	1						MONTRAL YUL		MONTRAL, CANADA	NO	JT8D 15
07/28/1989	984	2		CUCKOO		2R15	1	-SPL		AMSTERDAM	NO	CFM56
07/28/1989	985	1		GULL*				-PMI		PALMA MALLORCA, SPAIN	NO	CFM56
07/28/1989	1128	2						BNN-CCN CGN		COLOGNE/BONN, GERMANY	NO	CFM56
07/28/1989	1128	2						YEV-YYC YYC		BREMEN, GERMANY	NO	CFM56
07/29/1989	1129	1		PARTRIDGE*				BRE		CALGARY, CANADA	NO	CFM56
07/30/1989	986	1		GULL*				PHX		PHOENIX, AZ	YES	CFM56
07/30/1989	1131	1						ROC-PHL ROC		ROCHESTER, NY	NO	CFM56
07/30/1989	1132	1						-LHR		LONDON-HEATHROW, ENGLAND	NO	CFM56
07/31/1989	1133	1		HAWK*				ASP-ADL ASP		ALICE SPRINGS, AUSTRALIA	NO	CFM56
07/31/1989	1133	2						SEL		SEOUL, KOREA	NO	CFM56
08/01/1989	1134	2						SYD-BNE SYD		SYDNEY, AUSTRALIA	NO	CFM56
08/01/1989	1135	1						DAY		DAYTON, OH	YES	CFM56
08/02/1989	1136	1						FNT		FLINT, MI	YES	CFM56
08/02/1989	1190	1		GULL*				CHICAGO IL		CHICAGO, IL	NO	CFM56
08/02/1989	1198	1		GULL*				DUSSELDORF, GERMANY		DUSSELDORF, GERMANY	NO	CFM56
08/03/1989	1135	2		COMMON BUZZARD		3K180	1	DUS		PARIS, ORLY, FRANCE	NO	CFM56
08/03/1989	987	2						YUL-YVR YUL		MONTRAL, CANADA	NO	JT8D 17
08/05/1989	989	1						BUL-DKR BUL		BANJUL, GAMBIA	NO	JT8D 15
08/06/1989	988	1						STR		STUTTGART, GERMANY	NO	CFM56
08/07/1989	989	2						YVR-YYJ YYJ		VICTORIA, CANADA	NO	JT8D 9A
08/09/1989	1138	2		SWALLOW*				HAM		HAMBURG, GERMANY	NO	CFM56
08/10/1989	990	2						AMS		AMSTERDAM, NETHERLANDS	NO	CFM56
08/10/1989	1139	2						DTW		DETROIT, MI	YES	CFM56
08/10/1989	1140	1		RING-BILLED GULL		14N12	1	7.2	VCE-LHR VCE	VENICE, ITALY	NO	CFM56
08/11/1989	1141	2		EURASIAN KESTREL		5K27	1	BUL	MUC	MUNICH, GERMANY	NO	CFM56
08/12/1989	1142	1		ROCK DOVE		2P1	1	11.	TNG-BCN TNG	MUNICH, MOROCCO	NO	CFM56
08/13/1989	991	1						-DAL		DALLAS, TX	YES	CFM56
08/13/1989	1143	2						-ANS		AMSTERDAM, NETHERLANDS	NO	CFM56
08/14/1989	1144	1						ATH		ATHENS, GREECE	NO	CFM56
08/14/1989	1145	1						YVQ-YZF YVQ		NORMAN WELLS, CANADA	NO	JT8D 9A
08/15/1989	1142	2						VIE		VIENNA, AUSTRIA	NO	JT8D 9A
08/15/1989	1147	1						ORF		NORFOLK, VA	YES	CFM56
08/15/1989	1148	1						DEN-PHX		CO - AZ	YES	CFM56
08/16/1989	1144	2						-DAL		DALLAS, TX	YES	CFM56
08/16/1989	1145	1						DLU		DULUTH, MN	YES	CFM56
08/17/1989	1149	2						YUL-MCO YUL		CANADA	NO	JT8D 9A
08/18/1989	1149	2						YTC-YLG YTC-YLG		CANADA	NO	JT8D 9A
08/18/1989	1150	1		HOURNING DOVE		2P105	1	DAB-TMX		CANADA	NO	JT8D 17
08/19/1989	1151	2						-ORD		CHICAGO, IL	YES	CFM56
08/20/1989	993	2						DUS		DUSSELDORF, GERMANY	NO	CFM56
08/25/1989	992	2						CLE-SFO CLE		CLEVELAND, OH	YES	CFM56
08/26/1989	1160	1						-AMS		AMONTREAL, CANADA	NO	CFM56
08/26/1989	1148	1						-OKA		JAPAN	NO	JT8D 17
08/27/1989	997	2								CANADA	NO	CFM56
08/28/1989	1152	1								AMSTERDAM, NETHERLANDS	NO	CFM56
08/29/1989	1153	2						-DUB		DUBLIN, IRELAND	NO	CFM56
08/29/1989	1154	2								PROVIDENCE, RI	YES	CFM56
08/29/1989	1155	1								DALLAS, TX	YES	CFM56
08/29/1989	1179	2								HOUSTON, TX	YES	JT8D 78
08/30/1989	998	2								NIGERIA	NO	JT8D 15
08/31/1989	1156	2								CALGARY, CANADA	NO	JT8D 15
09/01/1989	1157	1										
09/03/1989	1159	2										
09/04/1989	1160	2										
09/05/1989	999	2										
09/05/1989	999	2										
09/05/1989	1000	2										
09/06/1989	1001	2										

SOURCE : ENGINE MANUFACTURER

EDATE	EVT#	ENG	POS	DNG	CODE	SEVERITY	PWV LOSS	MAX VIBE THROTTLE	IFSD	REMARKS
07/17/1989	980	2	A, I, K			9			NO	ODOR
07/18/1989	995	2	A, B, H			1-3	NONE		NO	EXTENSIVE GUIDE VANE DAM, 2 BLD'S TRYSFRA FOUND ON GRD INSPEC, 4 F BLD'S DAMAGED
07/18/1989	1120	2	A, H			3-3	NONE		NO	2 F BLD'S SHINGLED
07/18/1989	1121	1				9	NONE		NO	ODOR
07/18/1989	981	2				9	NONE		NO	55 DEAD BIRDS ON RUNWAY
07/20/1989	1123	1				9	NONE		NO	FOUND ON GRD INSPEC
07/21/1989	1124	1	A, C			9	NONE		NO	FOUND GRD INSPEC, SEVERAL DENTED F BLD'S
07/24/1989	982	1	A, C			9	NONE		NO	NICKS ON F BLD'S
07/25/1989	983	2				9	NONE		NO	MOMENTARY SHIFT IN ENG PARAMETERS
07/26/1989	984	1				9	NONE		NO	FOUND ON GRD INSPEC
07/27/1989	1125	2				9	NONE		NO	DENT AND LOOSE RIVETS IN NACELLE LIP
07/27/1989	1126	2	A, L			9	NONE		NO	EMERGENCY DECLARED
07/28/1989	984	2	A, F, I			9	NONE		NO	4 F BLD'S SHINGLED
07/28/1989	1128	2	A, H			9	NONE		NO	FOUND ON GRD INSPEC, 6 F BLD'S DAMAGED
07/28/1989	1129	2	A, B, H			9	NONE		NO	ODOR
07/29/1989	1130	1				9	NONE		NO	DENT AND LOOSE RIVETS IN NACELLE LIP
07/30/1989	996	1	A, H			9	NONE		NO	EMERGENCY DECLARED
07/30/1989	1131	1				9	NONE		NO	4 F BLD'S SHINGLED
07/31/1989	1132	1				9	NONE		NO	FOUND ON GRD INSPEC
07/31/1989	1133	2	A, B, H			9	NONE		NO	3 F BLD'S DAMAGED
08/01/1989	1134	2	A, B			9	NONE		NO	1 F BLD LEADING EDGE DENT
08/01/1989	1135	1	A, K			9	NONE		NO	AFT STGS OF HPC HAD IMPACT DAMAGE
08/02/1989	1136	1	A, D, H			9	NONE		NO	ODOR, REPLACED 1ST STG FAN ASSEMBLY
08/02/1989	1137	1	A, C			9	NONE		NO	PM EVENT, 1 BENT F BLD
08/02/1989	1206	1				9	NONE		NO	3 F BLD'S BENT IMMEDIATELY FROM STALL
08/03/1989	1207	2	A, C			9	NONE		NO	3 F BLD'S BENT, 4 FBLD TIPS WERE CUT OFF
08/03/1989	1208	1				9	NONE		NO	11 F BLD'S DAMAGED, 13 F OGV'S LE NICKS
08/05/1989	987	2	A, C			9	NONE		NO	MINOR HPC BLADE IMPACT DAMAGE
08/05/1989	1137	1				9	NONE		NO	ODOR
08/06/1989	988	1	A, C, I, K			9	NONE		NO	MULT AC STRIKES
08/09/1989	1138	2	A, B, G			9	NONE		NO	ODR
08/10/1989	990	2	A, K			9	NONE		NO	NO
08/10/1989	1139	2				9	NONE		NO	NO
08/10/1989	1140	1				9	NONE		NO	NO
08/10/1989	1141	2				9	NONE		NO	NO
08/10/1989	1142	2				9	NONE		NO	NO
08/12/1989	1143	1				9	NONE		NO	NO
08/12/1989	1144	1	A, H			9	NONE		NO	EPR
08/13/1989	1145	1	A, B, C			9	NONE		NO	1 F BLD SHINGLED
08/13/1989	1146	1	A, D			9	NONE		NO	1 F BLD TWISTED WITH LE DEFORMATION
08/14/1989	1147	1				9	NONE		NO	SEVERAL F BLD'S BENT
08/14/1989	1148	1				9	NONE		NO	ODOR, MULT AC STRIKES
08/15/1989	1149	2	A, B, H			9	NONE		NO	FOUND ON GRD INSPEC, 2 F BLD'S SHINGLED
08/15/1989	1150	1				9	NONE		NO	ODOR
08/16/1989	1151	2				9	NONE		NO	FOUND ON GRD INSPEC
08/16/1989	1152	1				9	NONE		NO	1 STG F BLD ASSEMBLY CHANGED
08/17/1989	1153	1	A, H			9	NONE		NO	FOUND ON GRD INSPEC
08/17/1989	1154	2				9	NONE		NO	2 F BLD'S BENT FOUND ON GRD INSPEC
08/17/1989	1155	1				9	NONE		NO	2 F BLD'S SHINGLED, 1 F BLD TIP BENT .5IN
08/18/1989	1156	2				9	NONE		NO	VIBES INCREASED THEN RETURNED TO NORMAL
08/19/1989	1157	1				9	NONE		NO	1 STG F BLD ASSEMBLY CHANGED
08/20/1989	1158	2	A, C, H			9	NONE		NO	FOUND ON GRD INSPEC
08/20/1989	1159	2	A, D, K			9	NONE		NO	FOUND ON GRD INSPEC
08/21/1989	1160	2				9	NONE		NO	2 F BLD'S DAMAGED
08/21/1989	1161	1	A, C, H			9	NONE		NO	ENG REM, 11 HPC BLD'S IMPACT DAMAGE
08/21/1989	1162	1	A, D, K			9	NONE		NO	ODOR, FOUND ON GRD INSPEC
08/22/1989	1163	2				9	NONE		NO	FAN CHANGED
08/22/1989	1164	2				9	NONE		NO	ODOR, MACELLE DAMAGE, 6 RIVETS SHEERED
08/23/1989	1165	1				9	NONE		NO	NO
08/24/1989	1166	2				9	NONE		NO	NO
08/25/1989	1167	1				9	NONE		NO	NO
08/26/1989	1168	1				9	NONE		NO	NO
08/27/1989	1169	2				9	NONE		NO	NO
08/28/1989	1170	1				9	NONE		NO	NO
08/29/1989	1171	2				9	NONE		NO	NO
08/30/1989	1172	1				9	NONE		NO	NO
08/31/1989	1173	2				9	NONE		NO	NO
08/31/1989	1174	1				9	NONE		NO	NO
09/01/1989	1175	2				9	NONE		NO	NO
09/03/1989	1176	2				9	NONE		NO	NO
09/04/1989	1177	1				9	NONE		NO	NO
09/05/1989	1178	2				9	NONE		NO	NO
09/05/1989	1179	2				9	NONE		NO	NO
09/06/1989	1180	2				9	NONE		NO	NO
09/06/1989	1001	2	A, L			9	NONE		NO	NO

SOURCE : ENGINE MANUFACTURER

E DATE	EVT#	ENG	POS	ETIME	SIGN	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL	RULES	L	COND'S	WEATHER	CREW	AC	AL	BIRD	SEE
09/06/1989	1161	2			NONE		UNKNOWN	300								NONE			YES	
09/08/1989	1002	2			NONE		TAKEOFF	200	0	105					ATO			ATO		NO
09/09/1989	1162	1			NONE		UNKNOWN	300							NONE			NONE		
09/11/1989	1003	2		6:05:00	NONE		TAKEOFF	200	0						ATO			ATO		
09/12/1989	1004	1			NONE		TAKEOFF	200							NONE			NONE		
09/13/1989	1163	1			NONE		UNKNOWN	300							NONE			NONE		
09/14/1989	1005	1			NONE		TAKEOFF	200	0	80					NONE			NONE		
09/20/1989	1164	2			NONE		LANDING	200	0	100	VFR	BRIGHT	CLEAR		ATO			ATO		
09/21/1989	1165	1			NONE		UNKNOWN	300							NONE			NONE		
09/21/1989	1178	1			NONE		UNKNOWN	300							NONE			NONE		
09/22/1989	1158	1			NONE		UNKNOWN	200							NONE			NONE		
09/23/1989	1166	2			NONE		LANDING	300	0						YES			YES		
09/23/1989	1167	2			NONE		APPROACH	300							NONE			NONE		
09/24/1989	1168	1			NONE		UNKNOWN	300							NONE			NONE		
09/26/1989	1169	2			MULT	BIRDS	400								NONE			NONE		
09/29/1989	1170	1			NONE		LANDING	300	0						NONE			NONE		
09/29/1989	1176	1			NONE		CLIMB	300							YES			ATB		
09/29/1989	1177	1			NONE		TAKEOFF	200							YES			ATB		
09/30/1989	1175	2			AIRWORTHY		TAKEOFF	200							NO			ATB		

SOURCE : ENGINE MANUFACTURER

EVT#	ENG	POS	BIRD_NAM	BIRD_SPE	#_BIRDS	WT	02	1	CITY	PRS	AIRPORT	LOCALE	US	INCID	ENGINE	DASH
09/06/1989	1161	2	GULL*		1	-	CTU		CHENGDU	CHINA			NO	CFM56	3	
09/08/1989	1302	2	GULL*		1	-	YWG-YVR	YWG	WINNIPEG	CANADA			NO	JTB0	9A	
09/09/1989	1162	1	GULL*		1	-	SE0		SAN FRANCISCO	CA			YES	CFM56	3	
09/11/1989	1003	2	GULL*		1	-	JNB-PLZ	JNB	JOHANNESBURG	S. AFRICA			NO	JTB0	9A	
09/12/1989	1004	1			1	-	YYC-LAX	YYC	CALGARY	CANADA			NO	JTB0	17	
09/13/1989	1163	1	HAWK*		1	-	AMS		AMSTERDAM	NETHERLANDS			NO	CFM56	3	
09/14/1989	1005	1	HAWK*		1	-	YWD-YZF	YAD	EDMONTON	CANADA			NO	JTB0	9A	
09/20/1989	1164	2			1	-	AMS		AMSTERDAM	NETHERLANDS			NO	CFM56	3	
09/21/1989	1165	1			1	-	LUTON		ENGLAND				NO	CFM56	3	
09/21/1989	1178	1	BLACK VULTURE		3K55		-LTW		CANADA				NO	JTB0	9A	
09/23/1989	1158	1			1	-	YWG-YVR	GIG	RIO DE JANEIRO	BRAZIL			NO	CFM56	3	
09/23/1989	1166	2			1	-	EUR		NEWARK	NJ			NO	CFM56	3	
09/23/1989	1167	2			1	-	GERMANY		GERMANY				YES	CFM56	3	
09/24/1989	1168	1			1	-	LGW		LONDON	ENGLAND			NO	CFM56	3	
09/26/1989	1169	2	HUNGARIAN PARTRIDGE		4L05		LTN		LUTON	ENGLAND			NO	CFM56	3	
09/29/1989	1170	1			1	-	YUE		NUREMBERG	GERMANY			NO	CFM56	3	
09/29/1989	1176	1			1	-	YVO-YUL	YVO	VAL D'OR	CANADA			NO	JTB0	7	
09/29/1989	1177	1			1	-	JAX-JAD	JAX	JACKSONVILLE	FL			YES	JTB0	7	
09/30/1989	1175	2			1	-	YUL-YV2	YUL	MONTEREAL	CANADA			NO			

SOURCE: ENGINE MANUFACTURER

EDATE	EVNT#	ENG	POS	DNG	CODE	SEVERITY	PW LOSS	MAX VIBE	THROTTLE	1FSD	REMARKS
09/06/1989	1161	2		A,B		3	NONE			NO	1FBLD LE SLIGHT BEND, FOUND ON GRD INSPE
09/08/1989	1002	2		A,H		3	COMPRESSOR			NO	
09/09/1989	1162	1		A		4	NONE			NO	FOUND ON GRD INSPEC, 2 F BLDS UNK DAMAGE
09/11/1989	1003	2				0	0			NO	
09/12/1989	1004	1				0	0			NO	ODOR
09/13/1989	1163	1		A,B		0	NONE			NO	FOUND ON GRD INSPEC, 2 F BLDS LE DISTORT
09/14/1989	1005	1				0	COMPRESSOR			NO	3 COMP STALLS
09/20/1989	1164	2				0	NONE			NO	VOLUNTARY
09/21/1989	1165	1		A,H		0	NONE			NO	ODOR
09/21/1989	1178	1				0	NONE			NO	3 ACOUSTIC PANELS CRACKED, 3 FBLD S SHING
09/22/1989	1158	1		A,K		0	NONE			NO	FOUND ON GRD INSPEC
09/23/1989	1166	2				0	NONE			NO	ENG REM AFT FLT TO GRU, HPC DAM ALL STGS
09/23/1989	1167	2				0	NONE			NO	FOUND ON GRD INSPEC
09/24/1989	1168	1				0	NONE			NO	FOUND ON GRD INSPEC
09/26/1989	1169	2		A,B,H		0	NONE			NO	8 FBLD S SHINGLED+7 FBLD S LE DISTORTION
09/29/1989	1170	1		A,B		0	NONE			NO	11 F BLDS LE DISTORTION
09/29/1989	1170	1				0	NONE			NO	
09/30/1989	1171	2				0	NONE			NO	
	1175	2				0	COMPRESSOR			NO	EXPERIENCED A BANG AND AC 'YAWED'

SOURCE : INTERNATIONAL CIVIL AVIATION ORGANIZATION

DATE	EVT#	ENG	POS	ETIME	SIGN	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL	RULES	L1	CONDOS	WEATHER	CREW AC	CREW AL	BIRD SEE
01/31/1987	614	2		12:58:00	NONE		300	LANDING	0	110			CLEAR		NONE	NO	FLOCK	
02/06/1987	623	1		10:40:00	MULT	BIRDS	300	TAKEOFF	0				CLOUDY		NONE	ATB	NO	
02/10/1987	655	2		18:41:00	NONE		200	CLIMB	350				CLOUDY		ATB	NON		
02/17/1987	589	2		17:45:00	NONE		300	LANDING					CLOUDY		NON	ATB	NO	
02/24/1987	663	1		12:12:00	MULT	ENG-BIRDS	200	TAKEOFF	0	150			CLOUDY		NON	NON		
02/22/1987	690	1		12:12:00	MULT	ENG-BIRDS	200	TAKEOFF	0	150			CLOUDY		NON	NON		
03/01/1987	622	2		16:20:00	NONE		200	UNKNOWN					CLEAR		NON	NON		
03/07/1987	687	2		6:35:00	MULT	BIRDS	300	LANDING					CLOUDY		NON	NON		
03/12/1987	595	1		7:09:00	MULT	BIRDS	300	TAKEOFF					CLOUDY		NON	NON		
03/16/1987	647	1		21:00:00	NONE		200	LANDING	0				CLOUDY		NON	YES		
03/26/1987	627	2		20:17:00	MULT	ENG-BIRDS	200	CLIMB	700	160			CLEAR		ATB	ATB	NO	
03/27/1987	664	2		27:08:00	NONE		200	CLIMB	700	160			CLOUDY		ATB	ATB	NO	
04/03/1987	684	1		9:30:00	MULT	BIRDS	300	TAKEOFF	0	140			OVERCAST		SEVERAL	SEVERAL	ONE	
04/06/1987	657	2		13:00:00	NONE		200	LANDING	200	140			CLEAR		NON	NO		
04/08/1987	665	2		10:50:00	NONE		300	TAKEOFF	200	175			CLEAR		NON	ONE		
04/12/1987	593	1		11:15:00	NONE		200	LANDING	0				CLOUDY		NON	NON		
04/14/1987	681	2		20:05:00	MULT	BIRDS	300	LANDING	150	125			CLOUDY		ONE	SEVERAL		
04/26/1987	660	1		10:38:00	NONE		300	LANDING	12	120			CLOUDY		ONE	SEVERAL		
05/01/1987	692	2		15:30:00	NONE		200	UNKNOWN	300	230			CLEAR		SEVERAL	SEVERAL		
05/10/1987	622	2		10:00:00	NONE		200	TAKEOFF	500	170			CLOUDY		NON	NO		
05/10/1987	687	2		17:48:00	MULT	BIRDS	200	LANDING	50	135			OVERCAST		NO	NO		
06/05/1987	694	2		10:00:00	NONE		200	TAKEOFF	50	135			CLEAR		NO	NO		
06/06/1987	662	1		10:40:00	NONE		200	TAKEOFF	50	135			CLEAR		NO	NO		
06/10/1987	608	1		1:25:00	NONE		200	TAKEOFF	0	110			CLOUDY		NO	NO		
06/12/1987	677	2		9:12:00	NONE		200	TAKEOFF	0	110			CLEAR		NO	NO		
06/19/1987	609	2		18:35:00	MULT	BIRDS	200	TAKEOFF	300	230			CLOUDY		NO	NO		
06/23/1987	674	1		6:40:00	NONE		200	CLIMB	300	230			OVERCAST		NO	NO		
06/24/1987	676	2		10:07:00	NONE		200	LANDING	100	125			CLOUDY		NO	NO		
06/28/1987	682	1		7:50:00	NONE		200	LANDING	100	125			OVERCAST		NO	NO		
06/30/1987	671	2		17:38:00	NONE		300	TAKEOFF	50	50			CLOUDY		NO	NO		
07/01/1987	629	2		9:00:00	NONE		200	TAKEOFF	0	90			CLOUDY		NO	NO		
07/13/1987	692	1		7:35:00	NONE		200	TAKEOFF	0	130			OVERCAST		NO	NO		
07/17/1987	632	2		16:54:00	NONE		200	TAKEOFF	100	125			CLOUDY		NO	NO		
07/19/1987	685	1		15:20:00	NONE		200	TAKEOFF	100	125			OVERCAST		NO	NO		
07/21/1987	615	2		18:20:00	MULT	BIRDS	200	TAKEOFF	100	128			CLOUDY		NO	NO		
07/24/1987	606	2		11:40:00	NONE		200	TAKEOFF	100	100			OVERCAST		NO	NO		
07/25/1987	605	1		9:00:00	NONE		200	TAKEOFF	100	100			CLEAR		NO	NO		
07/26/1987	612	2		13:20:00	NONE		200	TAKEOFF	100	123			CLOUDY		NO	NO		
07/27/1987	635	2		19:30:00	NONE		200	TAKEOFF	20	140			OVERCAST		NO	NO		
07/29/1987	619	2		14:16:00	MULT	BIRDS	200	LANDING	10	135			RAIN		NO	NO		
07/31/1987	624	1		17:01:00	NONE		200	LANDING	10	128			OVERCAST		NO	NO		
08/05/1987	643	1		12:00:00	NONE		200	LANDING	10	100			CLOUDY		NO	NO		
08/06/1987	626	2		18:10:00	NONE		200	LANDING	10	123			OVERCAST		NO	NO		
08/07/1987	649	2		8:15:00	NONE		200	TAKEOFF	0	130			RAIN		NO	NO		
08/12/1987	697	1		14:10:00	NONE		200	TAKEOFF	0	130			OVERCAST		NO	NO		
08/15/1987	659	2		10:00:00	NONE		200	LANDING	0	100			CLEAR		NO	NO		
08/18/1987	635	2		7:38:00	MULT	BIRDS	200	LANDING	0	100			OVERCAST		NO	NO		
08/21/1987	679	1		6:18:00	NONE		200	TAKEOFF	0	150			CLEAR		NO	NO		
08/22/1987	633	2		8:15:00	NONE		200	TAKEOFF	60				CLEAR		NO	NO		
08/24/1987	650	1		13:05:00	NONE		200	APPROACH	1500	170			CLEAR		NO	NO		
08/25/1987	680	1		12:00:00	MULT	BIRDS	200	LANDING	100	100			CLEAR		NO	NO		
08/27/1987	666	1		6:20:00	MULT	BIRDS	200	TAKEOFF	0	135			CLEAR		NO	NO		
08/27/1987	689	1		20:00:00	NONE		200	UNKNOWN	200				CLEAR		NO	NO		
08/28/1987	607	1		14:10:00	MULT	BIRDS	200	TAKEOFF	0	115			OVERCAST		NO	NO		
08/29/1987	598	1		14:10:00	MULT	BIRDS	200	TAKEOFF	0	120			CLEAR		NO	NO		
08/29/1987	620	1		18:00:00	NONE		200	TAKEOFF	0	100			CLEAR		NO	NO		
08/31/1987	669	1		22:15:00	NONE		200	UNKNOWN	0				CLEAR		NO	NO		
09/01/1987	603	1		22:15:00	NONE		200	TAKEOFF	0	140			CLEAR		NO	NO		
09/04/1987	604	1		9:00:00	NONE		200	TAKEOFF	0	140			CLOUDY		NO	NO		

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

EDATE	EVT#	ENG	POS	BIRD_NAM	BIRD_SPE	#_BIRDS	WT_QZ	1	CITY_PRS	AIRPORT	LOCALE	US_INCID	ENGINE	DASH	
01/31/1987	614	2		GULL*		1			LARNACA	CYPRUS		NO	CFM56	3	
02/06/1987	625	1							FRANKFURT	GERMANY		NO	CFM56	3	
02/10/1987	635	2		HAWK*					SHANWICK	IRELAND		NO	JT8D		
02/13/1987	589	2		KITE*					CANBERRA	AUSTRALIA		NO	CFM56	3	
02/21/1987	663	1		KITE*					CHAKLALA	PAKISTAN		NO	JT8D		
02/22/1987	690	2		KITE*					CLEARWATER	FL	YES	NO	JT8D		
02/22/1987	690	2		GULL*					FUNCHAL	MADEIRA, PORTUGAL		NO	JT8D		
03/02/1987	667	2		TRUE SPARROW*					COOLANGATTA	AUSTRALIA		NO	CFM56	3	
03/07/1987	590	1		HAWK*					TOWNSVILLE	AUSTRALIA		NO	CFM56	3	
03/12/1987	595	1							VADODARA	INDIA		NO	JT8D		
03/16/1987	647	1							BONN	GERMANY		NO	JT8D		
03/26/1987	627	2							LAHORE	PAKISTAN		NO	JT8D		
03/27/1987	664	2							LONDON, HEATHROW	ENGLAND		NO	CFM56	3	
03/31/1987	684	1							JOMO KENYATA	KENYA		NO	JT8D		
04/06/1987	657								FARO	PORTUGAL		NO	CFM56	3	
04/08/1987	665	2							TSV			NO	CFM56	3	
04/12/1987	596	1		AUSTRALIAN COURSER		10N9		1.	AMS	AMSTERDAM, NETHERLANDS		NO	CFM56	3	
04/14/1987	681	2		GULL*		70212		2.5	DRW	DARWIN	AUSTRALIA		NO	CFM56	3
04/26/1987	660	1							BHX	BIRMINGHAM	ENGLAND		NO	JT8D	
05/06/1987	591	1							CHRISTCHURCH	NEW ZEALAND		NO	JT8D		
05/08/1987	592	1							OTTAWA	CANADA		NO	JT8D		
05/10/1987	622	2							BKK	BANGKOK	THAILAND		NO	JT8D	
05/10/1987	687	1							YOW	PRINCE GEORGE	CANADA		NO	JT8D	
06/05/1987	694	2		VULTURE*					YXS	REUS	SPAIN		NO	JT8D	
06/08/1987	662	1		GULL*					PMI	PALMA	MALLORCA, SPAIN		NO	JT8D	
06/10/1987	608	1							GLA	GLASGOW	SCOTLAND		NO	JT8D	
06/12/1987	677	2							MAD	MADRID	SPAIN		NO	JT8D	
06/19/1987	609	2		SWALLOW*					TXL	W. BERLIN	GERMANY		NO	JT8D	
06/23/1987	674	1		GULL*					LGSK	SKIAHTOS	GREECE		NO	CFM56	3
06/24/1987	676	2							AMD	AHMEDABAD	INDIA		NO	JT8D	
06/28/1987	682	1							LTN	LONDON, LUTON	ENGLAND		NO	JT8D	
06/30/1987	671	2							KRP	KASTRUP	DENMARK		NO	JT8D	
07/01/1987	628	2							YCG	CASTLEGAR	CANADA		NO	JT8D	
07/13/1987	629	2		GULL*		5N33		3.	YYC	CALGARY	ALTA., CANADA		NO	JT8D	
07/17/1987	692	1		PARTRIDGE*					NPEARSON	NEARSON	CANADA		NO	JT8D	
07/19/1987	632	2		KITE*					AMRTSAR	AMRITSAR	INDIA		NO	JT8D	
07/21/1987	685	1							LDE	LOURDES	FRANCE		NO	JT8D	
07/24/1987	615	2		KILLEDER					MLA	LUGA	MALTA		NO	JT8D	
07/25/1987	606	2		GULL*					EDUO	GUTERSTOHN	GERMANY		NO	JT8D	
07/26/1987	605	1							S2G	SALZBURG	AUSTRIA		NO	JT8D	
07/26/1987	612	2							PAT	PATNA	INDIA		NO	JT8D	
07/27/1987	635	1							MUC	MUNICH	GERMANY		NO	JT8D	
07/29/1987	619	2		HAWK*					VTZ	VISAKHAPATNAM	INDIA		NO	JT8D	
07/30/1987	658	2		PIGEON*					LNZ	LONZ	AUSTRIA		NO	CFM56	3
07/31/1987	624	1							IXR	RANCHI	INDIA		NO	JT8D	
08/05/1987	600	2							GMTT	BOUKHALF	MOROCCO		NO	JT8D	
08/06/1987	643	1		KITE*					HAM	HAMBURG	GERMANY		NO	JT8D	
08/06/1987	626	2		LAPWING*					LBS	MUGLA	TURKEY		NO	JT8D	
08/07/1987	649	1							AMD	AHMEDABAD	INDIA		NO	JT8D	
08/12/1987	693	2							DEL	DELHI	INDIA		NO	JT8D	
08/12/1987	645	2		HAWK*					SVO	FAO	PORTUGAL		NO	JT8D	
08/18/1987	679	2		GULL*					NCL	NEW CASTLE	ENGLAND		NO	JT8D	
08/18/1987	645	2							YXJ	FT ST JOHN	CANADA		NO	JT8D	
08/22/1987	633	2							LNZ	LONZ	AUSTRIA		NO	JT8D	
08/23/1987	650	1							LDE	LOURDES	FRANCE		NO	JT8D	
08/24/1987	666	1							J.G.SRI JDOM	S. AFRICA		NO	JT8D		
08/27/1987	689	1							EBOS	OOSTENDE	BELGIUM		NO	JT8D	
08/28/1987	607	1							WBSS	BRUNEL INT'L	MALAYSIA		NO	JT8D	
08/29/1987	598	1							MEL	MELBOURNE	AUSTRALIA		NO	CFM56	3
08/31/1987	620	1													
09/01/1987	669	1													
09/01/1987	603	1													
09/04/1987	604	2													
09/04/1987	593	2													

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

DATE	EVT#	ENG	POS	DNG	CODE	SEVERITY	POW LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
01/31/1987	614	2									MEDIUM BIRD
02/06/1987	623	1	655	2	A						MEDIUM BIRD, MINOR DAMAGE 4 FAN BLADES DAMAGED
02/10/1987	589	2									LARGE BIRD
02/13/1987	603	1									MEDIUM BIRD
02/21/1987	627	1	690	1							SMALL BIRD
02/22/1987	697										LARGE BIRD
03/02/1987	607										SMALL BIRD
03/07/1987	590										LARGE BIRD
03/12/1987	595										SMALL BIRD
03/16/1987	627										MEDIUM BIRD, MINOR DAMAGE
03/26/1987	627										MEDIUM BIRD, MINOR DAMAGE
03/31/1987	604										SMALL BIRD, MINOR DAMAGE
04/06/1987	657										SMALL BIRD
04/08/1987	605										MEDIUM BIRD
04/12/1987	681										SMALL BIRD
04/14/1987	680										MEDIUM BIRD
04/26/1987	627										SMALL BIRD
05/08/1987	592										MEDIUM BIRD
05/10/1987	627										SMALL BIRD
05/10/1987	627										MEDIUM BIRD
06/05/1987	694										SUBSTANTIAL DAMAGE
06/08/1987	652										MEDIUM BIRD
06/10/1987	608										SMALL BIRD
06/12/1987	677										SMALL BIRD
06/19/1987	609										SUBSTANTIAL DAMAGE, ENGINE CHANGED
06/23/1987	674										
06/24/1987	576										
06/28/1987	682										
06/30/1987	628										
07/01/1987	692										
07/13/1987	6325										
07/17/1987	635										
07/19/1987	685										
07/21/1987	615										
07/24/1987	606										
07/26/1987	605										
07/27/1987	612										
07/29/1987	635										
07/31/1987	619										
08/01/1987	658										
08/05/1987	624										
08/06/1987	600										
08/07/1987	643										
08/12/1987	626										
08/15/1987	659										
08/18/1987	659										
08/22/1987	633										
08/23/1987	650										
08/27/1987	666										
08/28/1987	607										
08/29/1987	598										
08/31/1987	620										
09/01/1987	669										
09/01/1987	603										
09/01/1987	604										
09/04/1987	593										

SOURCE : INTERNATIONAL CIVIL AVIATION ORGANIZATION

EDATE	EVT#	ENG	POS	ETIME	SIGN	EVNT	AIRCRAFT	POF	ALTITUDE	SPEED	FL RULES	L1	COND	WEATHER	CREW	AC	CREW	BIRD	SEE
09/04/1987	672	1		19:55:00	MULT	ENG	200	TAKEOFF	0	100		CLEAR			NONE	NONE	NO	FLOCK	
09/04/1987	672	2		19:55:00	MULT	ENG	200	TAKEOFF	0	100		CLEAR			NONE	NONE	NO	FLOCK	
09/04/1987	672	1		19:55:00	MULT	ENG-BIRDS	200	TAKEOFF	0	90		CLEAR			NONE	NONE	NO	SEVERAL	
09/04/1987	696	2		10:39:00	MULT	ENG-BIRDS	200	TAKEOFF	0	90		CLEAR			NONE	NONE	NO	SEVERAL	
09/05/1987	678	1		11:20:00	NONE		300	LANDING	0	100		OVERCAST	RAIN		NONE	NONE	NO	FLOCK	
09/06/1987	699	2		11:20:00	NONE		300	LANDING	0	80		OVERCAST	RAIN		NONE	NONE	NO	SEVERAL	
09/21/1987	621	1		9:55:00	NONE		200	TAKEOFF	0	140		CLEAR	CLOUDY		NONE	NONE	NO	NO	
09/21/1987	673	2		13:49:00	NONE		200	TAKEOFF	0	140		CLOUDY	CLOUDY		NONE	NONE	NO	NO	
09/22/1987	668	1		10:57:00	NONE		200	TAKEOFF	0	150		CLEAR	CLOUDY		NONE	NONE	NO	NO	
10/01/1987	613	1		19:35:00	NONE		200	CRUISE	0	140		CLEAR	CLOUDY		ATB	ATB	NO	ONE	
10/04/1987	630	1		19:55:00	NONE		200	TAKEOFF	10	140		CLEAR	CLOUDY		NONE	NONE	NO	NO	
10/04/1987	684	2		17:09:00	NONE		200	TAKEOFF	75	140		CLEAR	CLOUDY		NONE	NONE	NO	NO	
10/07/1987	654	1		13:30:00	NONE		200	LANDING	0	100		CLEAR	CLOUDY		NONE	NONE	NO	NO	
10/11/1987	601	1		16:01:00	NONE		200	APPROACH	100	140		CLEAR	CLOUDY		NONE	NONE	NO	NO	
10/11/1987	616	1		16:11:00	NONE		100	TAKEOFF	0	0		CLEAR	CLOUDY		ATB	ATB	NO	ONE	
10/11/1987	683	2		19:30:00	NONE		200	PARKED	0	0		CLEAR	CLOUDY		NONE	NONE	NO	NO	
10/19/1987	661	1		20:15:00	MULT	BIRDS	300	LANDING	0	130		CLOUDY	CLOUDY		ONE	SEVERAL	NO	NO	
10/29/1987	594	1		17:00:00	NONE		300	TAKEOFF	0	200		CLOUDY	CLOUDY		ONE	SEVERAL	NO	NO	
10/31/1987	675	2		18:13:00	NONE		200	LANDING	200	125		CLOUDY	CLOUDY		ONE	SEVERAL	NO	NO	
11/08/1987	652	2		20:10:00	NONE		200	UNKNOWN	250	130		CLOUDY	CLOUDY		OTHER	NO	YES	NO	
11/09/1987	611	2		22:22:00	MULT	BIRDS	200	LANDING	0	120		CLOUDY	CLOUDY		ATB	ATB	NO	NO	
11/10/1987	617	2		18:00:00	NONE		100	TAKEOFF	0	120		CLOUDY	CLOUDY		ONE	SEVERAL	NO	NO	
11/10/1987	695	1		14:30:00	NONE		200	TAKEOFF	10	138		CLOUDY	CLOUDY		ATB	ATB	NO	NO	
11/24/1987	646	2		11:05:00	MULT	BIRDS	200	TAKEOFF	0	142		CLOUDY	CLOUDY		ONE	SEVERAL	NO	NO	
11/26/1987	656	1		16:37:00	NONE		200	TAKEOFF	0	130		CLEAR	CLEAR		ATB	ATB	NO	NO	
12/02/1987	639	2		12:05:00	MULT	BIRDS	300	APPROACH	0	70		CLOUDY	CLOUDY		ONE	NO	NO	NO	
12/04/1987	688	1		12:05:00	NONE		200	TAKEOFF	0	70		CLOUDY	CLOUDY		ATB	ATB	NO	NO	
12/08/1987	651	2		16:37:00	NONE		200	TAKEOFF	0	70		CLOUDY	CLOUDY		ONE	NO	NO	NO	
12/15/1987	678	1		8:22:00	NONE		200	TAKEOFF	0	70		CLOUDY	CLOUDY		ATB	ATB	NO	NO	
12/27/1987	641	2		16:35:00	NONE		200	TAKEOFF	0	110		OVERCAST	OVERCAST		ONE	NO	NO	NO	
01/03/1988	1234	1		10:00:00	NONE		100	APPROACH	1000	130		CLEAR	CLEAR		ATB	ATB	NO	NO	
01/04/1988	1297	1		10:15:00	MULT	ENG-BIRDS	300	APPROACH	200	130		CLEAR	CLEAR		ONE	SEVERAL	NO	NO	
01/20/1988	1225	2		10:15:00	MULT	ENG-BIRDS	300	LANDING	200	130		CLOUDY	CLOUDY		ATB	ATB	NO	NO	
01/27/1988	1272	2		9:57:00	NONE		200	TAKEOFF	0	150		CLEAR	CLEAR		ONE	SEVERAL	NO	NO	
02/04/1988	1292	2		19:40:00	NONE		300	APPROACH	600	130		CLOUDY	CLOUDY		ATB	ATB	NO	NO	
02/05/1988	1264	1		17:18:00	NONE		200	LANDING	0	125		OVERCAST	OVERCAST		ONE	NO	NO	NO	
02/15/1988	1253	2		10:35:00	NONE		200	APPROACH	0	110		CLEAR	CLEAR		ATB	ATB	NO	NO	
03/07/1988	1304	1		11:05:00	NONE		300	TAKEOFF	50	145		CLEAR	CLEAR		ONE	SEVERAL	NO	NO	
03/13/1988	1284	2		17:55:00	MULT	ENG-BIRDS	300	TAKEOFF	50	145		CLEAR	CLEAR		ATB	ATB	NO	NO	
03/22/1988	1270	1		11:30:00	MULT	ENG-BIRDS	11:30	CLIMB	700	170		CLOUDY	CLOUDY		ONE	SEVERAL	NO	NO	
03/29/1988	1249	1		23:19:00	MULT	ENG-BIRDS	20:02:00	TAKEOFF	0	130		CLOUDY	CLOUDY		ATB	ATB	NO	NO	
04/16/1988	1215	1		14:30:00	NONE		100	TAXI	0	10		CLOUDY	CLOUDY		ONE	SEVERAL	NO	NO	
04/16/1988	1265	2		18:30:00	NONE		300	TAKEOFF	75	135		CLOUDY	CLOUDY		ATB	ATB	NO	NO	
04/18/1988	1247	2		15:20:00	MULT	BIRDS	100	LANDING	75	135		CLOUDY	CLOUDY		ONE	SEVERAL	NO	NO	
04/26/1988	1289	2		6:50:00	NONE		100	TAKEOFF	75	135		CLOUDY	CLOUDY		ATB	ATB	NO	NO	
04/28/1988	1246	1		23:19:00	MULT	BIRDS	200	APPROACH	1000	142		CLOUDY	CLOUDY		ONE	SEVERAL	NO	NO	
04/29/1988	1319	1		27:54:00	NONE		100	LANDING	20	135		CLEAR	CLEAR		ONE	ONE	NO	NO	
04/30/1988	1293	1		21:28:00	NONE		100	TAKEOFF	0	10		CLOUDY	CLOUDY		ONE	SEVERAL	NO	NO	
05/10/1988	1212	2		11:05:00	MULT	ENG	100	APPROACH	500	140		CLOUDY	CLOUDY		ONE	SEVERAL	NO	NO	
05/11/1988	1251	2		9:00:00	MULT	BIRDS	100	LANDING	0	110		CLEAR	CLEAR		ONE	SEVERAL	NO	NO	
05/15/1988	1256	2		15:25:00	MULT	BIRDS	100	TAKEOFF	0	110		CLEAR	CLOUDY		ONE	SEVERAL	NO	NO	
05/22/1988	1288	1		17:10:00	MULT	BIRDS	200	TAKEOFF	0	140		CLEAR	CLOUDY		ONE	SEVERAL	NO	NO	
05/24/1988	1314	2		13:00:00	MULT	BIRDS	200	APPROACH	500	140		CLEAR	CLOUDY		ONE	SEVERAL	NO	NO	
05/29/1988	1260	1		12:10:00	MULT	BIRDS	200	TAKEOFF	0	140		CLEAR	CLOUDY		ONE	SEVERAL	NO	NO	
06/02/1988	1227	2		11:10:00	MULT	BIRDS	200	APPROACH	500	140		CLEAR	CLOUDY		ONE	SEVERAL	NO	NO	
06/09/1988	1221	1		13:30:00	NONE		200	LANDING	20	120		TAKEOFF	TAKEOFF		ONE	SEVERAL	NO	NO	
06/09/1988	1308	2		13:30:00	NONE		200	TAKEOFF	0	95		TAKEOFF	TAKEOFF		ONE	SEVERAL	NO	NO	

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

EDATE	EVN#	ENG_POS	BIRD_NAM	BIRD_SPE	#_BIRDS	WT_02_1	CITY_PRS	AIRPORT	LOCATE	US_INCID	ENGINE_DASH
06/04/1987	672	1	GULL*		672	2	IBIZA, SPAIN	IBZ	JTBD	NO	JTBD
06/04/1987	672	2	GULL*		672	1	IBIZA, SPAIN	IBZ	JTBD	NO	JTBD
06/04/1987	696	1	COMMON BUZZARD		696	2	FT SMITH, CANADA	YSM	JTBD	NO	JTBD
06/04/1987	696	2	GOOSE*		696	1	NICE, FRANCE	NEC	CFM56	3	CFM56
06/05/1987	618	1	GOOSE*		618	1	LONZ, AUSTRIA	LNZ	CFM56	3	CFM56
06/06/1987	599	2	SWIFT*		599	2	LOURDES, FRANCE	LDE	CFM56	3	CFM56
06/21/1987	621	1	DOVE*		673	2	IBIZA, SPAIN	IBZ	FACT	NO	JTBD
06/22/1987	668	1	LAPWING*		668	1	D.F. WALTER S. AFRICA	DFW	JTBD	NO	JTBD
10/01/1987	613	1	GULL*		630	1	NPEARSON INTL, CANADA	NPC	JTBD	NO	JTBD
10/04/1987	630	1	COMMON BUZZARD		654	2	HONG KONG, HONG KONG	HKG	JTBD	NO	JTBD
10/07/1987	654	2	GOOSE*		654	2	TEES SIDE, ENGLAND	TEES	JTBD	NO	JTBD
10/11/1987	601	1	COMMON BUZZARD		652	2	CORK, IRELAND	CORK	JTBD	NO	JTBD
10/11/1987	616	1	GOOSE*		616	1	WIEN SCHWECHAT, AUSTRIA	WEN	JTBD	NO	JTBD
10/11/1987	693	2	COMMON SKYLARK		693	2	GLASGOW, SCOTLAND	GLA	JTBD	NO	JTBD
10/29/1987	694	1	AUSTRALIAN BELL MAGPIE		594	1	AMSTERDAM, NETHERLANDS	AMS	JTBD	NO	JTBD
10/31/1987	675	2	LITTLE OWL		2327	11.	ROCHHAMPTON, AUSTRALIA	ROK	JTBD	NO	JTBD
11/08/1987	652	2	GOOSE*		2327	11.	REUS, SPAIN	REU	JTBD	NO	JTBD
11/09/1987	611	1	COMMON SKYLARK		2327	11.	EICK	ECK	JTBD	NO	JTBD
11/11/1987	617	2	KITE*		17272	1.5	LOWA	LOW	JTBD	NO	JTBD
11/20/1987	651	1	GULL*		646	2	FACT	FACT	JTBD	NO	JTBD
11/24/1987	678	1	IBISE*		656	1	BLAGNAC, FRANCE	BLA	JTBD	NO	JTBD
11/26/1987	651	2	BLACK-HEADED GULL		14N36	10.	PRINCE CHARLES ZIMBABWE	FVCP	JTBD	NO	JTBD
12/02/1987	639	2	GULL*		14N36	10.	SXR	SXR	JTBD	NO	JTBD
12/04/1987	659	2	GOOSE*		14N36	10.	SRINAGAR, INDIA	SRN	JTBD	NO	JTBD
12/08/1987	688	1	COMMON SKYLARK		14N36	10.	BORGO PANIGALE, ITALY	LIPE	JTBD	NO	JTBD
12/15/1987	651	1	KITE*		14N36	10.	GUAHATI, INDIA	GUA	JTBD	NO	JTBD
12/27/1987	678	2	GULL*		14N36	10.	HYDERABAD, INDIA	HYD	JTBD	NO	JTBD
12/28/1987	661	2	IBISE*		14N36	10.	VANCOUVER, CANADA	YVR	JTBD	NO	JTBD
01/03/1988	670	1	BLACK-HEADED GULL		14N36	10.	PRINCE CHARLES ZIMBABWE	FVCP	JTBD	NO	JTBD
01/04/1988	1234	1	GULL*		14N36	10.	SRI LANKA, S. ASIA	SRL	JTBD	NO	JTBD
01/20/1988	1225	1	GULL*		14N36	10.	JAN SHUTS, S. ASIA	JSH	JTBD	NO	JTBD
01/27/1988	1225	2	GULL*		14N36	10.	NICE, FRANCE	NCE	JTBD	NO	JTBD
01/27/1988	1292	2	GULL*		14N36	10.	SAMOS, GREECE	SMS	JTBD	NO	JTBD
02/04/1988	1264	1	GULL*		14N36	10.	CAIRNS, AUSTRALIA	CNS	JTBD	NO	JTBD
02/05/1988	1253	2	GULL*		14N36	10.	LUTON, ENGLAND	LTN	JTBD	NO	JTBD
02/15/1988	1223	1	BARN OWL		14N36	10.	SACRAMENTO, CA	SMF	JTBD	NO	JTBD
03/07/1988	1304	1	AMERICAN BLACK VULTURE		1S2	60.	SYDNEY, AUSTRALIA	SYD	JTBD	NO	JTBD
03/13/1988	1228	2	GULL*		14N36	10.	HANOVER, GERMANY	HAN	JTBD	NO	JTBD
03/22/1988	1284	1	GULL*		14N36	10.	BRUSSELS, BELGIUM	BRU	JTBD	NO	JTBD
03/22/1988	1270	2	GULL*		14N36	10.	TARRAGNA, URUGUAY	TBT	JTBD	NO	JTBD
03/29/1988	1249	1	SWALLOW*		14N36	10.	CARRASCO, URUGUAY	MVD	JTBD	NO	JTBD
03/29/1988	1249	2	SWALLOW*		14N36	10.	MT. ISA, AUSTRALIA	ISA	JTBD	NO	JTBD
04/16/1988	1259	1	PIGEON*		14N36	10.	DURBAN, S. AFRICA	DUR	JTBD	NO	JTBD
04/16/1988	1215	1	WOOD PIGEON		14N36	10.	DTMB	DTMB	JTBD	NO	JTBD
04/18/1988	1265	2	PIGEON*		14N36	10.	ALICANTE, SPAIN	ALC	JTBD	NO	JTBD
04/20/1988	1289	2	WOOD PIGEON		14N36	10.	SYDNEY, AUSTRALIA	SYD	JTBD	NO	JTBD
04/26/1988	1240	1	KITE*		14N36	10.	GOSSELIES, BELGIUM	EBCI	JTBD	NO	JTBD
04/28/1988	1249	2	KITE*		14N36	10.	PERTH, AUSTRALIA	PER	JTBD	NO	JTBD
04/29/1988	1259	1	HOODED CROW*		14N14	1.	LGW	LGW	JTBD	NO	JTBD
04/29/1988	1203	1	HERRING GULL		14N14	1.	STAVANGER, NORWAY	SVG	JTBD	NO	JTBD
04/30/1988	1203	1	KITE*		14N14	1.	RABAT, MOROCCO	RBA	JTBD	NO	JTBD
05/10/1988	1212	1	COMMON SWIFT		1055	2.	CONSTANTINE, ALGERIA	C2L	JTBD	NO	JTBD
05/10/1988	1212	2	SWALLOW*		1055	2.	CONSTANTINE, ALGERIA	C2L	JTBD	NO	JTBD
05/11/1988	1251	2	KITE*		1055	2.	HAMBURG, GERMANY	HAM	JTBD	NO	JTBD
05/15/1988	1220	1	HOODED CROW*		1055	2.	BARCELONA, SPAIN	BCN	JTBD	NO	JTBD
05/15/1988	1256	2	HERRING GULL		1055	2.	ALGIERS, ALGERIA	ALG	JTBD	NO	JTBD
05/22/1988	1288	1	KITE*		1055	2.	PATNA, INDIA	PHI	JTBD	NO	JTBD
05/22/1988	1314	2	PIGEON*		1055	2.	ZURICH, SWITZERLAND	ZRH	JTBD	NO	JTBD
05/24/1988	1306	2	GLAUCOUS WINGED GULL		14N22	56.	TESSERA, ITALY	LIPZ	JTBD	NO	JTBD
05/29/1988	1269	1	SKYLARK		17272	1.	KEFLAVIK, ICELAND	KEF	JTBD	NO	JTBD
06/02/1988	1227	2	CURLEW*		17272	1.	NAPLES, ITALY	NAP	JTBD	NO	JTBD
06/09/1988	1308	2	CURLEW*		17272	1.	BIRMINGHAM, ENGLAND	BHX	JTBD	NO	JTBD
06/09/1988	1308	2	TRONDHEIM, NORWAY		17272	1.	TRONDHEIM, NORWAY	TRD	JTBD	NO	JTBD

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

DATE	EVT#	ENG POS	DMG CODE	SEVERITY	PW LOSS	MAX VIBE	THROTTLE	IFSD	REMARKS
09/04/1987	672	1							9
09/04/1987	672	2							9
09/04/1987	696	1							9
09/04/1987	696	2							9
09/05/1987	618	-1							9
09/06/1987	599	2							9
09/21/1987	621	1							9
09/21/1987	673	2							9
09/22/1987	668	1							9
10/01/1987	613	1							9
10/04/1987	630								9
10/04/1987	686	2							9
10/07/1987	654								9
10/11/1987	601	1							9
10/11/1987	616	1							9
10/11/1987	683	2							9
10/19/1987	661	-1							9
10/29/1987	675	2	A						9
10/31/1987	654	2	A						9
11/08/1987	652	2	A						9
11/11/1987	611	2	A						9
11/20/1987	617	2	A						9
11/24/1987	695	-2	A						9
11/26/1987	646	-2	A						9
12/02/1987	656		A						9
12/04/1987	639	2	A						9
12/06/1987	688	1	A						9
12/15/1987	651	-1	A						9
12/27/1987	678	2	A						9
12/28/1987	641	2	A						9
01/03/1988	670		A						9
01/04/1988	1234	-1	A						9
01/20/1988	1297	1	A						9
01/20/1988	1225	2	A						9
01/27/1988	1272	2	A						9
02/04/1988	1264	2	A						9
02/05/1988	1253	2	A						9
02/15/1988	1223	1	A						9
03/07/1988	1230	4	A						9
03/13/1988	1228	2	A						9
03/18/1988	1284	1	A						9
03/22/1988	1270	-1	A						9
03/22/1988	1249	2	A						9
03/29/1988	1259	2	A						9
04/16/1988	1215	1	A						9
04/16/1988	1265	2	A						9
04/20/1988	1289	2	A						9
04/26/1988	1246	2	A						9
04/28/1988	1319	-1	A						9
04/29/1988	1303	1	A						9
04/30/1988	1293	1	A						9
05/10/1988	1212	2	A						9
05/11/1988	1251	2	A						9
05/15/1988	1220	2	A						9
05/21/1988	1256	2	A						9
05/22/1988	1288	2	A						9
05/24/1988	1314	2	A,C,K						9
05/29/1988	1306	2	A						9
06/02/1988	1260	2	A						9
06/09/1988	1227	2	A						9
06/09/1988	1221	2	A						9
06/09/1988	1308	2	A						9

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

DATE	EV#	ENG	POS	ETIME	SIGN	EV#	AIRCRAFT	POF	ALTITUDE	SPEED	FL	RULES	LT	CONDOS	WEATHER	CREW	AC	CREW AL	BIRD SEE
06/10/1988	1261	2		13:25:00	MULT	BIRDS	200	TAKEOFF	0	70		CLEAR	CLEAR	CLEAR	NONE	NONE	FLOCK		
06/11/1988	1273	2		14:42:00	NONE		200	TAKEOFF	50	150		CLEAR	CLEAR	CLEAR	NONE	NONE	SEVERAL		
06/12/1988	1219	1		20:10:00	MULT	BIRDS	100	CLIMB	500	155		CLEAR	CLEAR	CLEAR	NONE	NONE	SEVERAL		
06/13/1988	1274	1		7:02:00	NONE		300	LANDING	0	125		CLEAR	CLEAR	CLEAR	NONE	NONE	ONE		
06/14/1988	1281	2		19:11:00	NONE		300	CLIMB	0	120		CLEAR	CLEAR	CLOUDY	NONE	NONE	ONE		
06/15/1988	1254	1		21:05:00	MULT	BIRDS	300	LANDING	0	90		CLEAR	CLEAR	CLOUDY	NONE	NONE	SEVERAL		
06/16/1988	1217	2		20:28:00	NONE		200	TAKEOFF	0	140		CLEAR	CLEAR	CLOUDY	NONE	NONE	ONE		
06/17/1988	1282	1		7:20:00	MULT	BIRDS	200	LANDING	0	115		CLEAR	CLEAR	CLOUDY	NONE	NONE	SEVERAL		
06/20/1988	1302	1		19:30:00	MULT	BIRDS	200	LANDING	10	130		CLEAR	CLEAR	CLOUDY	NONE	NONE	FLOCK		
06/23/1988	1222	2		6:15:00	MULT	BIRDS	300	CLIMB	600	135		CLOUDY	CLOUDY	CLOUDY	NONE	NONE	SEVERAL		
06/25/1988	1268	2		20:10:00	NONE		300	APPROACH	50	145		CLOUDY	CLOUDY	CLOUDY	NONE	NONE	SEVERAL		
06/27/1988	1262	1		8:00:00	NONE		300	TAKEOFF	0	145		CLOUDY	CLOUDY	CLOUDY	NONE	NONE	ONE		
06/29/1988	1267	2		17:00:00	MULT	BIRDS	300	CLIMB	150	150		CLOUDY	CLOUDY	CLOUDY	ATB	NO	SEVERAL		
06/29/1988	1285	1		4:00:00	NONE		400	LANDING	0	120		CLOUDY	CLOUDY	CLOUDY	NONE	NO	FLOCK		
07/01/1988	1280	1		9:30:00	MULT	BIRDS	300	TAKEOFF	20	160		CLEAR	CLEAR	CLEAR	NONE	NO	FLOCK		
07/05/1988	1291	1		19:30:00	NONE		6:00:00	MULT	50	130		RAIN	RAIN	RAIN	NONE	NO	SEVERAL		
07/07/1988	1286	1		11:20:00	NONE		300	LANDING	0	100		OVERCAST	OVERCAST	OVERCAST	NONE	NO	ONE		
07/11/1988	1233	1		9:40:00	MULT	BIRDS	200	LANDING	30	125		CLEAR	CLEAR	CLEAR	NONE	NO	SEVERAL		
07/15/1988	1252	2		11:20:00	NONE		11:20:00	MULT	0	120		CLEAR	CLEAR	CLEAR	NONE	NO	ONE		
07/15/1988	1245	2		9:40:00	MULT	BIRDS	200	LANDING	0	120		CLEAR	CLEAR	CLEAR	NONE	NO	ONE		
07/16/1988	1310	1		20:15:00	NONE		200	TAKEOFF	0	120		CLEAR	CLEAR	CLEAR	NONE	NO	SEVERAL		
07/19/1988	1307	1		5:04:00	NONE		200	TAKEOFF	0	120		CLEAR	CLEAR	CLEAR	NONE	NO	ONE		
07/20/1988	1229	2		6:00:00	NONE		100	TAKEOFF	0	120		CLEAR	CLEAR	CLEAR	NONE	NO	SEVERAL		
07/25/1988	1224	2		7:02:00	MULT	BIRDS	200	TAKEOFF	0	120		CLOUDY	CLOUDY	CLOUDY	NONE	NO	SEVERAL		
07/26/1988	1243	1		21:00:00	NONE		200	CLIMB	3500	250		CLEAR	CLEAR	CLEAR	NONE	NO	SEVERAL		
07/26/1988	1275	2		17:00:00	NONE		17:00:00	MULT	10	130		CLEAR	CLEAR	CLEAR	NONE	NO	SEVERAL		
07/27/1988	1309	1		11:20:00	NONE		200	APPROACH	800	170		CLEAR	CLEAR	CLOUDY	ATO	NO	ONE		
07/28/1988	1235	2		8:17:00	MULT	BIRDS	100	TAKEOFF	0	100		CLEAR	CLEAR	CLEAR	NONE	NO	SEVERAL		
07/28/1988	1266	1		13:00:00	NONE		300	LANDING	0	40		CLEAR	CLEAR	CLEAR	NONE	NO	SEVERAL		
07/30/1988	1315	2		13:00:00	NONE		300	APPROACH	50	140		CLEAR	CLEAR	CLEAR	NONE	NO	SEVERAL		
07/31/1988	1315	1		13:00:00	NONE		300	LANDING	0	140		CLEAR	CLEAR	CLOUDY	ATO	YES	ONE		
08/01/1988	1261	1		1:55:00	NONE		100	TAKEOFF	0	150		CLEAR	CLEAR	CLOUDY	ATO	YES	ONE		
08/02/1988	1246	1		16:03:00	NONE		12:30:00	MULT	225	136		CLEAR	CLEAR	CLOUDY	ATO	YES	ONE		
08/06/1988	213	1		14:43:00	MULT	BIRDS	300	TAKEOFF	150	120		CLEAR	CLEAR	CLOUDY	ATO	NO	SEVERAL		
08/09/1988	1214	1		9:48:00	MULT	BIRDS	100	LANDING	0	122		CLEAR	CLEAR	CLOUDY	ATO	NO	SEVERAL		
08/09/1988	1230	1		10:00:00	NONE		100	TAKEOFF	0	130		CLEAR	CLEAR	CLOUDY	ATO	NO	SEVERAL		
08/18/1988	1298	2		20:26:00	NONE		100	TAKEOFF	0	140		CLEAR	CLEAR	CLOUDY	ATO	YES	ONE		
08/20/1988	1287	1		9:20:00	NONE		100	TAKEOFF	0	150		CLEAR	CLEAR	CLOUDY	ATO	NO	SEVERAL		
08/20/1988	1294	2		12:30:00	NONE		12:30:00	MULT	0	120		CLEAR	CLEAR	CLOUDY	ATO	NO	SEVERAL		
08/21/1988	1257	2		9:20:00	NONE		100	TAKEOFF	150	138		CLEAR	CLEAR	CLOUDY	ATO	NO	SEVERAL		
08/22/1988	1295	1		13:59:00	MULT	BIRDS	200	LANDING	0	120		CLEAR	CLEAR	CLOUDY	ATO	NO	SEVERAL		
08/29/1988	1313	1		14:59:00	NONE		100	APPROACH	1000	140		CLEAR	CLEAR	CLOUDY	ATO	NO	SEVERAL		
08/18/1988	1298	2		7:12:00	MULT	ENG-BIRDS	200	TAKEOFF	0	60		RAIN	RAIN	RAIN	ATO	NO	FLOCK		
08/20/1988	1287	1		7:12:00	MULT	ENG-BIRDS	200	TAKEOFF	0	60		CLEAR	CLEAR	CLOUDY	ATO	NO	FLOCK		
08/21/1988	1277	2		14:50:00	MULT	ENG-BIRDS	100	TAKEOFF	0	135		CLEAR	CLEAR	CLOUDY	ATO	NO	FLOCK		
08/22/1988	1295	1		13:59:00	MULT	ENG-BIRDS	200	LANDING	0	125		CLEAR	CLEAR	CLOUDY	ATO	NO	FLOCK		
08/29/1988	1313	1		14:59:00	MULT	ENG-BIRDS	200	APPROACH	1000	140		CLEAR	CLEAR	CLOUDY	ATO	NO	FLOCK		
09/01/1988	1255	2		12:30:00	NONE		200	TAKEOFF	0	130		OVERCAST	OVERCAST	OVERCAST	ATO	NO	SEVERAL		
09/01/1988	1277	2		14:50:00	MULT	ENG-BIRDS	200	TAKEOFF	0	130		CLEAR	CLEAR	CLOUDY	ATO	NO	SEVERAL		
09/05/1988	1311	2		9:10:00	NONE		300	TAKEOFF	0	130		CLOUDY	CLOUDY	CLOUDY	ATO	NO	SEVERAL		
09/05/1988	1250	1		15:45:00	NONE		200	LANDING	100	120		FOG	FOG	FOG	ATO	NO	SEVERAL		
09/07/1988	1263	1		15:45:00	NONE		200	TAKEOFF	0	130		RAIN	RAIN	RAIN	ATO	NO	SEVERAL		
09/08/1988	1263	1		17:10:00	NONE		200	TAKEOFF	0	125		CLEAR	CLEAR	CLOUDY	ATO	NO	SEVERAL		
09/11/1988	1241	1		14:20:00	NONE		200	TAKEOFF	0	130		CLOUDY	CLOUDY	CLOUDY	ATO	NO	SEVERAL		
09/23/1988	1210	1		9:10:00	NONE		300	APPROACH	600	139		OVERCAST	OVERCAST	OVERCAST	ATO	NO	SEVERAL		
09/25/1988	1218	1		15:45:00	NONE		200	TAKEOFF	0	140		CLEAR	CLEAR	CLOUDY	ATO	NO	SEVERAL		
09/28/1988	1250	2		9:10:00	NONE		300	TAKEOFF	0	130		CLOUDY	CLOUDY	CLOUDY	ATO	NO	SEVERAL		
09/29/1988	1271	2		17:30:00	NONE		200	TAKEOFF	0	130		FOG	FOG	FOG	ATO	NO	SEVERAL		
10/04/1988	1244	2		10:06:00	NONE		200	TAKEOFF	0	130		CLOUDY	CLOUDY	CLOUDY	ATO	NO	SEVERAL		
10/08/1988	1211	1		7:05:00	NONE		200	TAKEOFF	0	130		CLOUDY	CLOUDY	CLOUDY	ATO	NO	SEVERAL		
10/12/1988	1290	2		10:25:00	NONE		200	LANDING	100	120		FOG	FOG	FOG	ATO	NO	SEVERAL		
10/14/1988	1276	1		10:18:00	MULT	BIRDS	200	TAKEOFF	0	130		CLOUDY	CLOUDY	CLOUDY	ATO	NO	SEVERAL		
10/26/1988	1216	2		12:53:00	MULT	BIRDS	300	LANDING	0	130		OVERCAST	OVERCAST	OVERCAST	ATO	NO	SEVERAL		
10/29/1988	1236	1		9:19:00	NONE		200	TAKEOFF	0	160		CLEAR	CLEAR	CLOUDY	ATO	NO	SEVERAL		
11/09/1988	1305	1		14:03:00	MULT	ENG-BIRDS	200	TAKEOFF	0	137		OVERCAST	OVERCAST	OVERCAST	ATO	NO	SEVERAL		
11/09/1988	1305	2		14:03:00	MULT	ENG-BIRDS	200	TAKEOFF	0	137		CLEAR	CLEAR	CLOUDY	ATO	NO	SEVERAL		
11/10/1988	1258	1		21:55:00	NONE		200	CLIMB	125	125		CLOUDY	CLOUDY	CLOUDY	ATO	NO	SEVERAL		
11/14/1988	1237	1		13:45:00	MULT	BIRDS	200	LANDING	5	5		CLOUDY	CLOUDY	CLOUDY	ATO	NO	SEVERAL		

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

US INCID ENGINE DASH									
EVT#	ENG_POS	BIRD_NAM	BIRD_SPE	# BIRDS	WT	02	1	CITY	PRSS AIRPORT
EDATE								LOCATE	LOCALE
06/10/1988	1261	GULL*		1				NO	JTB0
06/11/1988	1273							NO	JTB0
06/12/1988	1219	SILVER GULL	14N32	12.				NO	CFM56
06/12/1988	1274	GULL*						NO	CFM56
06/13/1988	1281	GULL*						NO	CFM56
06/14/1988	1254	KITE*						NO	CFM56
06/18/1988	1282	SHALLOW*						NO	CFM56
06/20/1988	1302	OWL*						NO	CFM56
06/21/1988	1222	SHALLOW*						NO	CFM56
06/21/1988	1263							NO	CFM56
06/21/1988	1264							NO	CFM56
06/21/1988	1265							NO	CFM56
06/21/1988	1266							NO	CFM56
06/21/1988	1267							NO	CFM56
06/21/1988	1282							NO	CFM56
06/21/1988	1283							NO	CFM56
06/21/1988	1284							NO	CFM56
06/21/1988	1285							NO	CFM56
06/21/1988	1286							NO	CFM56
06/21/1988	1291							NO	CFM56
06/21/1988	1286	HAWK*						NO	CFM56
06/21/1988	1287	PIGEON*						NO	CFM56
06/21/1988	1288	GULL*						NO	CFM56
06/21/1988	1289	EUROPEAN SPARROW HAWK	3K103					NO	CFM56
06/21/1988	1290							NO	CFM56
06/21/1988	1291							NO	CFM56
06/21/1988	1292							NO	CFM56
06/21/1988	1293							NO	CFM56
06/21/1988	1294							NO	CFM56
06/21/1988	1295							NO	CFM56
06/21/1988	1296							NO	CFM56
06/21/1988	1297							NO	CFM56
06/21/1988	1298							NO	CFM56
06/21/1988	1299	HERRING GULL	14N14	40.				NO	CFM56
06/21/1988	1300	HAWK*						NO	CFM56
06/21/1988	1301							NO	CFM56
06/21/1988	1302	SPARROW*						NO	CFM56
06/21/1988	1303	BARN OWL	1S2	11.25				NO	CFM56
06/21/1988	1304							NO	CFM56
06/21/1988	1305							NO	CFM56
06/21/1988	1306							NO	CFM56
06/21/1988	1307							NO	CFM56
06/21/1988	1308							NO	CFM56
06/21/1988	1309							NO	CFM56
06/21/1988	1310							NO	CFM56
06/21/1988	1311							NO	CFM56
06/21/1988	1312							NO	CFM56
06/21/1988	1313							NO	CFM56
06/21/1988	1314							NO	CFM56
06/21/1988	1315							NO	CFM56
06/21/1988	1316							NO	CFM56
06/21/1988	1317							NO	CFM56
06/21/1988	1318							NO	CFM56
06/21/1988	1319							NO	CFM56
06/21/1988	1320							NO	CFM56
06/21/1988	1321							NO	CFM56
06/21/1988	1322							NO	CFM56
06/21/1988	1323							NO	CFM56
06/21/1988	1324							NO	CFM56
06/21/1988	1325							NO	CFM56
06/21/1988	1326							NO	CFM56
06/21/1988	1327							NO	CFM56
06/21/1988	1328							NO	CFM56
06/21/1988	1329							NO	CFM56
06/21/1988	1330							NO	CFM56
06/21/1988	1331							NO	CFM56
06/21/1988	1332							NO	CFM56
06/21/1988	1333							NO	CFM56
06/21/1988	1334							NO	CFM56
06/21/1988	1335							NO	CFM56
06/21/1988	1336							NO	CFM56
06/21/1988	1337							NO	CFM56
06/21/1988	1338							NO	CFM56
06/21/1988	1339							NO	CFM56
06/21/1988	1340							NO	CFM56
06/21/1988	1341							NO	CFM56
06/21/1988	1342							NO	CFM56
06/21/1988	1343							NO	CFM56
06/21/1988	1344							NO	CFM56
06/21/1988	1345							NO	CFM56
06/21/1988	1346							NO	CFM56
06/21/1988	1347							NO	CFM56
06/21/1988	1348							NO	CFM56
06/21/1988	1349							NO	CFM56
06/21/1988	1350							NO	CFM56
06/21/1988	1351							NO	CFM56
06/21/1988	1352							NO	CFM56
06/21/1988	1353							NO	CFM56
06/21/1988	1354							NO	CFM56
06/21/1988	1355							NO	CFM56
06/21/1988	1356							NO	CFM56
06/21/1988	1357							NO	CFM56
06/21/1988	1358							NO	CFM56
06/21/1988	1359							NO	CFM56
06/21/1988	1360							NO	CFM56
06/21/1988	1361							NO	CFM56
06/21/1988	1362							NO	CFM56
06/21/1988	1363							NO	CFM56
06/21/1988	1364							NO	CFM56
06/21/1988	1365							NO	CFM56
06/21/1988	1366							NO	CFM56
06/21/1988	1367							NO	CFM56
06/21/1988	1368							NO	CFM56
06/21/1988	1369							NO	CFM56
06/21/1988	1370							NO	CFM56
06/21/1988	1371							NO	CFM56
06/21/1988	1372							NO	CFM56
06/21/1988	1373							NO	CFM56
06/21/1988	1374							NO	CFM56
06/21/1988	1375							NO	CFM56
06/21/1988	1376							NO	CFM56
06/21/1988	1377							NO	CFM56
06/21/1988	1378							NO	CFM56
06/21/1988	1379							NO	CFM56
06/21/1988	1380							NO	CFM56
06/21/1988	1381							NO	CFM56
06/21/1988	1382							NO	CFM56
06/21/1988	1383							NO	CFM56
06/21/1988	1384							NO	CFM56
06/21/1988	1385							NO	CFM56
06/21/1988	1386							NO	CFM56
06/21/1988	1387							NO	CFM56
06/21/1988	1388							NO	CFM56
06/21/1988	1389							NO	CFM56
06/21/1988	1390							NO	CFM56
06/21/1988	1391							NO	CFM56
06/21/1988	1392							NO	CFM56
06/21/1988	1393							NO	CFM56
06/21/1988	1394							NO	CFM56
06/21/1988	1395							NO	CFM56
06/21/1988	1396							NO	CFM56
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06/21/1988	1398							NO	CFM56
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06/21/1988	1403							NO	CFM56
06/21/1988	1404							NO	CFM56
06/21/1988	1405							NO	CFM56
06/21/1988	1406							NO	CFM56
06/21/1988	1407							NO	CFM56
06/21/1988	1408							NO	CFM56
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06/21/1988	1414							NO	CFM56
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06/21/1988	1417							NO	CFM56
06/21/1988	1418							NO	CFM56
06/21/1988	1419							NO	CFM56
06/21/1988	1420							NO	CFM56
06/21/1988	1421							NO	CFM56
06/21/1988	1422							NO	CFM56
06/21/1988	1423							NO	CFM56
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06/21/1988	1425							NO	CFM56
06/21/1988	1426							NO	CFM56
06/21/1988	1427							NO	CFM56
06/21/1988	1428							NO	CFM56
06/21/1988	1429							NO	CFM56
06/21/1988	1430							NO	CFM56
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06/21/1988	1434							NO	CFM56
06/21/1988	1435							NO	CFM56
06/21/1988	1436							NO	CFM56
06/21/1988	1437							NO	CFM56
06/21/1988	1438							NO	CFM56
06/21/1988	1439							NO	CFM56
06/21/1988	1440								

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

EDATE	EVT#	ENG POS	ONS CODE	SEVERITY	POW LOSS	MAX VICE THROTTLE	IFSD	REMARKS
06/10/1988	1261	2						
06/11/1988	1273	2						
06/12/1988	1219	1						
06/13/1988	1274	1						
06/14/1988	1281	2						
06/15/1988	1254	2						
06/16/1988	1217	2						
06/17/1988	1282	1	A, K					
06/18/1988	1222	2	A, D					
06/19/1988	1268	2						
06/20/1988	1262	2						
06/21/1988	1265	2						
06/22/1988	1285	1						
06/23/1988	1286	1						
06/24/1988	1233	2						
06/25/1988	1252	2						
06/26/1988	1245	2						
06/27/1988	1250	2						
06/28/1988	1243	2						
06/29/1988	1247	2						
06/30/1988	1259	2						
07/01/1988	1291	1						
07/02/1988	1237	2						
07/03/1988	1252	2						
07/04/1988	1245	2						
07/05/1988	1250	2						
07/06/1988	1248	2						
07/07/1988	1217	2						
07/08/1988	1266	2						
07/09/1988	1264	2						
07/10/1988	1243	2						
07/11/1988	1255	2						
07/12/1988	1248	2						
07/13/1988	1269	2						
07/14/1988	1213	2						
07/15/1988	1230	2						
07/16/1988	1254	2						
07/17/1988	1250	2						
07/18/1988	1287	2						
07/19/1988	1255	2						
07/20/1988	1294	2						
07/21/1988	1257	2						
07/22/1988	1295	2						
07/23/1988	1255	2						
07/24/1988	1277	2						
07/25/1988	1226	2						
07/26/1988	1271	2						
07/27/1988	1251	2						
07/28/1988	1271	2						
07/29/1988	1251	2						
07/30/1988	1271	2						
07/31/1988	1251	2						
08/01/1988	1269	2						
08/02/1988	1248	2						
08/03/1988	1213	2						
08/04/1988	1214	2						
08/05/1988	1230	2						
08/06/1988	1254	2						
08/07/1988	1250	2						
08/08/1988	1287	2						
08/09/1988	1255	2						
08/10/1988	1294	2						
08/11/1988	1257	2						
08/12/1988	1295	2						
08/13/1988	1255	2						
08/14/1988	1277	2						
08/15/1988	1226	2						
08/16/1988	1271	2						
08/17/1988	1251	2						
08/18/1988	1271	2						
08/19/1988	1251	2						
08/20/1988	1287	2						
08/21/1988	1255	2						
08/22/1988	1294	2						
08/23/1988	1257	2						
08/24/1988	1295	2						
08/25/1988	1255	2						
08/26/1988	1277	2						
08/27/1988	1226	2						
08/28/1988	1271	2						
08/29/1988	1251	2						
08/30/1988	1271	2						
08/31/1988	1251	2						
09/01/1988	1287	2						
09/02/1988	1255	2						
09/03/1988	1294	2						
09/04/1988	1257	2						
09/05/1988	1295	2						
09/06/1988	1255	2						
09/07/1988	1277	2						
09/08/1988	1226	2						
09/09/1988	1271	2						
09/10/1988	1251	2						
09/11/1988	1271	2						
09/12/1988	1251	2						
09/13/1988	1287	2						
09/14/1988	1255	2						
09/15/1988	1294	2						
09/16/1988	1257	2						
09/17/1988	1295	2						
09/18/1988	1255	2						
09/19/1988	1277	2						
09/20/1988	1226	2						
09/21/1988	1271	2						
09/22/1988	1251	2						
09/23/1988	1271	2						
09/24/1988	1251	2						
09/25/1988	1287	2						
09/26/1988	1255	2						
09/27/1988	1294	2						
09/28/1988	1257	2						
09/29/1988	1295	2						
09/30/1988	1255	2						
10/01/1988	1277	2						
10/02/1988	1226	2						
10/03/1988	1271	2						
10/04/1988	1251	2						
10/05/1988	1271	2						
10/06/1988	1251	2						
10/07/1988	1287	2						
10/08/1988	1255	2						
10/09/1988	1294	2						
10/10/1988	1257	2						
10/11/1988	1295	2						
10/12/1988	1255	2						
10/13/1988	1277	2						
10/14/1988	1226	2						
10/15/1988	1271	2						
10/16/1988	1251	2						
10/17/1988	1271	2						
10/18/1988	1251	2						
10/19/1988	1287	2						
10/20/1988	1255	2						
10/21/1988	1294	2						
10/22/1988	1257	2						
10/23/1988	1295	2						
10/24/1988	1255	2						
10/25/1988	1277	2						
10/26/1988	1226	2						
10/27/1988	1271	2						
10/28/1988	1251	2						
10/29/1988	1271	2						
10/30/1988	1251	2						
10/31/1988	1287	2						
11/01/1988	1255	2						
11/02/1988	1294	2						
11/03/1988	1257	2						
11/04/1988	1295	2						
11/05/1988	1255	2						
11/06/1988	1277	2						
11/07/1988	1226	2						
11/08/1988	1271	2						
11/09/1988	1251	2						
11/10/1988	1271	2						
11/11/1988	1251	2						
11/12/1988	1287	2						
11/13/1988	1255	2						
11/14/1988	1294	2						
11/15/1988	1257	2						
11/16/1988	1295	2						
11/17/1988	1255	2						
11/18/1988	1277	2						
11/19/1988	1226	2						
11/20/1988	1271	2						
11/21/1988	1251	2						
11/22/1988	1271	2						
11/23/1988	1251	2						
11/24/1988	1287	2						
11/25/1988	1255	2						
11/26/1988	1294	2						
11/27/1988	1257	2						
11/28/1988	1295	2						
11/29/1988	1255	2						
11/30/1988	1277	2						
11/31/1988	1226	2						
12/01/1988	1271	2						
12/02/1988	1251	2						
12/03/1988	1271	2						
12/04/1988	1251	2						
12/05/1988	1287	2						
12/06/1988	1255	2						
12/07/1988	1294	2						
12/08/1988	1257	2						
12/09/1988	1295	2						
12/10/1988	1255	2						
12/11/1988	1277	2						
12/12/1988	1226	2						

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

DATE	EVT#	ENG	POS	ETIME	SIGN	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL	RULES	LT	CONDOS	WEATHER	CREW	AC	CREW AL	BIRD SEE
11/14/1988	1278	1		6:00:00	NONE		TAKOFF		0	140		CLEAR		NONE	NO				
11/15/1988	1238	1		16:15:00	NONE		APPROACH		50	120		RAIN		NONE	NO	FLOCK			
11/16/1988	1296	2		7:31:00	NONE		LANDING		0	120		CLOUDY		NONE	NO	ONE			
11/17/1988	1279	1		13:51:00	NONE		TAKEOFF		0	130		OVERCAST		NONE	NO	FLOCK			
11/19/1988	1300	2		16:10:00	MULT	BIRDS	LANDING		0	130		CLOUDY		ATB	NO	SEVERAL			
12/05/1988	1318	1		9:41:00	NONE		TAKEOFF		0	140		OVERCAST		NONE	NO	FLOCK			
12/07/1988	1239	1		16:06:00	MULT	ENG-BIRDS	LANDING		0	100		OVERCAST		NONE	NO	FLOCK			
12/07/1988	1239	2		16:46:00	MULT	ENG-BIRDS	LANDING		0	100		OVERCAST		NONE	NO	FLOCK			
12/10/1988	1283	1			NONE		TAKEOFF		0	100		OVERCAST		NONE	NO	FLOCK			
12/14/1988	1262	1			MULT	BIRDS	TAKEOFF		0	125		CLEAR		NONE	NO	FLOCK			
12/20/1988	1301	1		15:15:00	MULT	ENG-BIRDS	LANDING		10	120		OVERCAST		NONE	NO	FLOCK			
12/20/1988	1301	2		15:15:00	MULT	ENG-BIRDS	LANDING		10	120		OVERCAST		NONE	NO	FLOCK			
12/22/1988	1232	2		16:25:00	MULT	BIRDS	LANDING		30	124		OVERCAST		YES	YES	FLOCK			

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

US INCID	ENGINE DASH	US INCID	ENGINE DASH
LOCATE	AIRPORT	LOCATE	AIRPORT
MAA	MAURITIUS	INDIA	CFH56
NCE	NICE, FRANCE	INDIA	CFH56
SZG	SALZBURG, AUSTRIA	INDIA	CFH56
LENG	MALAGA, SPAIN	INDIA	CFH56
AMS	AMSTERDAM, NETHERLANDS	INDIA	CFH56
BHI	BAHIA BLANCA, ARGENTINA	INDIA	CFH56
DUS	DUSSELDORF, GERMANY	INDIA	CFH56
BOD	DUSSELDORF, GERMANY	INDIA	CFH56
ELP	BORDEAUX, FRANCE	INDIA	CFH56
AMS	EL PASO, TX	INDIA	CFH56
AMS	AMSTERDAM, NETHERLANDS	INDIA	CFH56
CDG	PARIS, FRANCE	INDIA	CFH56

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

E DATE	EVT#	ENG	POS	DMG	CODE	SEVERITY	POW LOSS	MAX VIBE	THROTTLE	IFSD	REMARKS
11/16/1988	1278		1								
11/15/1988	1238		1								
11/16/1988	1296		2								
11/17/1988	1279		1								
11/19/1988	1300		2								
12/05/1988	1318		1								
12/07/1988	1219		1								
12/07/1988	1239		2								
12/10/1988	1283		1								
12/14/1988	1262		1								A,K
12/20/1988	1301		1								
12/22/1988	1232		2								A

18 F BLDS + 8 COMP BLDS UNK DAMAGE

APPENDIX C

STATISTICAL HYPOTHESIS TESTING

Statistical analyses are based on an underlying probabilistic model of the processes that give rise to the data. For example, to provide the basis for comparing the weights of ingested birds in the United States and overseas it is necessary to hypothesize an underlying random distribution of bird weights. Statistical analyses are somewhat more sophisticated than descriptive data analyses and more care is required to ensure that the methods are appropriate for the data.

Statistical analysis is basically formalized inductive reasoning. Hypotheses about bird ingestion hazards are evaluated for consistency with the data that have been collected. Statistical analysis provides the rules for quantifying the level of consistency forming the basis for objective unbiased decisions. The process is known formally as statistical hypothesis testing and a brief outline of the procedure is presented here.

The basis of a statistical hypothesis test is the hypothesis; which is a formal statement about a relationship in the data. In comparing the weight distributions of United States ingestions versus foreign ingestions, one hypothesis is that there is no difference in the sizes of the birds ingested here versus those ingested overseas. If the data are found to be consistent with the hypothesis it is accepted; otherwise the hypothesis is rejected.

The rules for deciding whether to accept or reject the hypothesis are based on the possible errors that could be made. A type I error refers to the situation in which the hypothesis is true; however we reject the hypothesis. Alternatively when we accept the hypothesis when it is not true we commit a type II error.

The goal of the statistician is to minimize the likelihood of both types of errors. Unfortunately the likelihood of a type I error is reciprocally linked to the likelihood of a type II error so that lowering the likelihood of a type I error will increase the likelihood of a type II error. Since only one error can be fully controlled it has become standard practice to control the likelihood of a Type I error; which is called the significance level of the test. The test hypothesis is chosen so that it should be accepted unless there is strong evidence that it is not true and the test is constructed to minimize the likelihood of a type II error for the given significance level over a broad range of alternatives.

The mechanics of conducting a statistical hypothesis test are implemented by calculating a test statistic. The test statistic is a function of the data that is related to the test hypothesis. It is usually constructed so that small values are consistent with the null hypothesis and large values are consistent with the alternative hypothesis. The cutoff for accepting or rejecting the null hypothesis is called the critical value and is a function of the desired significance level.

Another aspect in evaluating the efficiency of a statistical test is its ability to detect when the test hypothesis is false. This ability is called the power of the test and is defined to be the probability of rejecting the test hypothesis when it is false. Generally there are many alternatives to the test hypothesis so that the power of the test is a function of the specific alternate hypothesis.

A variation on the statistical hypothesis test is the calculation of a confidence interval for a parameter such as the overall probability of ingestion (POI). Since there is no specific hypothesis about the POI, a confidence interval is used to describe the range of probabilities that are consistent with the data. The confidence level associated with a confidence interval corresponds to one minus the significance level of a hypothesis test and is a measure of the likelihood that the true value of the parameter (in this case the POI) is contained in the interval.